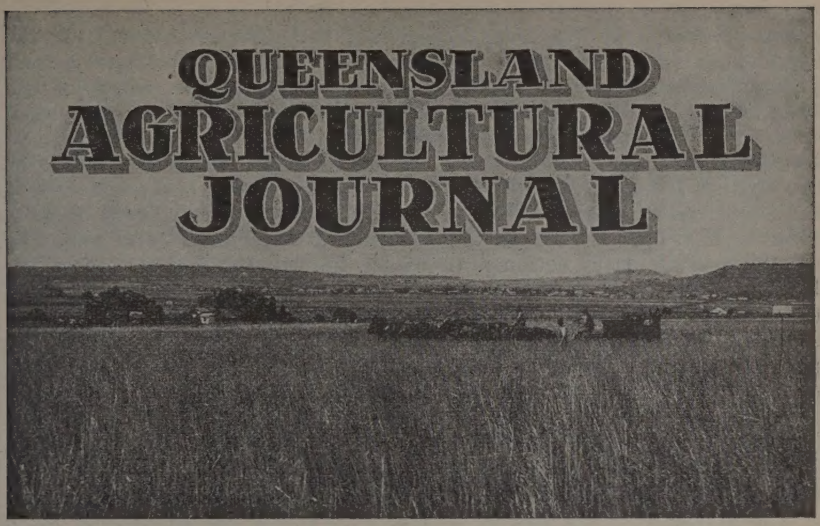

VOL XLIII. 1 APRIL, 1935. PART 4

The Queensland Sugar Industry.

Premier's Address to Cane Growers' Council.

"CRITICISM of the Commonwealth Government in renewing the sugar agreement came chiefly from a State that benefits very largely by the arrangement made by the Commonwealth in regard to wheat. **There is no difference in principle between establishing a home price for wheat than there is in establishing a home price for sugar,** and Victoria, South Australia, and West Australia reap the major benefit from the wheat agreement."

The Premier (Hon. W. Forgan Smith) made the foregoing statement when opening the ninth annual conference of the Queensland Cane Growers' Council on 18th March, and in the course of an important address he described his negotiations on behalf of the sugar industry when in England last year. The conference was representative of every sugar district in the State, as well as of the Northern Rivers of New South Wales. The Premier's address was listened to with the closest attention, and at frequent intervals his remarks were warmly applauded.

The Premier said:—Conferences of primary producers are of great value to a State such as Queensland, dependent upon the prosperity of its producers. The sugar industry occupies a position of major importance amongst the primary industries of Queensland, because of the high percentage of employment involved and the benefits of such employment—not only to Queensland, but to Southern manufacturers. We realise, of course, that in return for the embargo and price paid by the people of Australia we must reciprocate in purchases of Southern products, and statistics show that we have carried out this obligation to the full, so much so that the balance of trade actually is in favour of the Southern States.

Mission to Great Britian.

The year since your last conference has been filled with very many important matters affecting your welfare. At the invitation of the

sugar producers of Queensland, I visited Britain and investigated the sugar position at first hand, as well as the marketing of Queensland products generally. As published, the opportunity was taken of my visit to London to reorganise the British Empire Producers' Organisation, and it is confidently expected that this reconstitution will be beneficial to Australian industry. I also brought under the notice of the British Ministers certain factors in connection with the renewal of the Preference Agreement for a long term. The Acting Agent-General (Mr. L. H. Pike) is in close touch with the Government and will take whatever preliminary action is necessary immediately the report of the British Sugar Inquiry Committee is available. It is apparent, from the delay in the presentation of this report, that the British Government is having some difficulty in arriving at its decision. Unfortunately, no permanent improvement in prices on the world's markets has yet been manifested. On the contrary, as all of your are no doubt aware, prices receded last November to the lowest level ever recorded—foreign sugar having been sold on the British market at less than £4 per ton. Although it does not seem that anything less than that price should be possible, it must be remembered that this very unremunerative return was reached —if anything very low can be said to be reached—by practically slave conditions in the principal exporting country of the world (Cuba), and you will have noticed from the Press reports of revolutionary movements as a consequence.

Commonwealth Sugar Agreement.

The published notification of the Commonwealth Government's intention to renew the sugar agreement will have the effect of stabilising this industry. The Government has advised the Prime Minister of the acceptance by the industry's representatives of the conditions announced by Mr. Lyons, and now awaits receipt of the draft agreement. When in the South in February, I discussed the proposal with the Prime Minister, who gave me certain assurances, and it is pleasing that, in the interests of Australia, as well as of Queensland, the stabilisation announcement was made to enable the preparation and planting of the coming crop to proceed. Whilst there have been objections voiced, more particularly in Victoria, it is mostly being fanned by the freetrade and tariff reform leaguers, and, in view of the fact that the balance of trade is in favour of Victoria, it is difficult to follow that State's objection. It was pleasing to see the Australian manufacturers' secretary voicing his approval of the renewal of the agreement. When the principal objective of all governments is the creation of employment and the stabilisation of rural industries, it is indeed strange that any objection should be made to an industry such as yours, in which such a high percentage is disbursed in wages, with beneficial effects to other manufacturing industries in Australia. Regarding the agreement, the only details available are those published, and the main alteration is an additional assistance of £16,000, making £216,000 to your fellow-producers of the fruit industry.

I may say that during my interview with Mr. Lyons recently I furnished him with the latest information regarding British preference which may come up for discussion on his visit, and I have placed at his disposal the services of Mr. Pike, who is thoroughly *au fait* with the situation. In this connection a lecture delivered by Mr. Pike in London —as reported in the Brisbane "Telegraph" of 12th March, 1935—is particularly appropos at the present moment and has its lesson for Australia.

I observe from your agenda that many matters are listed which are of great importance. I can assure you that your conclusions, provided that such are the general desire of the whole industry, will always

receive the same sympathetic consideration of the Government as has been given in the past. A great responsibility rests on you. You are faced with the dictum of the Commonwealth Government regarding over-production. You have been kept advised by my office of the overtures of the Chadbourne people, and you must keep abreast of the world situation insofar as it affects sugar. These are all matters which, no doubt, will have your attention at the conference, but you can rest assured that the Government is alive to your interests, which, after all, are the Government's interests—that is, the welfare of the Australian cane sugar industry.

The Spirit of Co-operation.

It is necessary for me to enlarge a little on one phase which is of particular moment. I would say that the organisation of the sugar industry and its efforts for greater efficiency, and consequently its own welfare, are the admiration of other primary producers. Your mill suppliers' committees, your district executives, and your council give you many advantages. Your success is due to the spirit of co-operation which has existed between all sections and districts of your organisation. It is recognised that individualism would have wrecked your industry. I think you should strive to continue this feature. It must not be forgotten that the sugar agreement and the Commonwealth embargo are major items of policy. It is based on a "White Australia" principle and is intended to protect all engaged in the industry—farmers and workers alike. For that reason, therefore, any question affecting the industry must be looked at by all interests from the point of view of the complete unit, rather than from that of the individual sections.

Now, the position of the Government is quite clear. Apart altogether from our obligations under the sugar agreement, the Government at all times has fully recognised the difficulties of the position. The Government recognises that of the £8 per ton approximately received for export sugar, £3 12s. is due to British preference. The Government considers that you producers have a duty to Australia in return for the embargo —to produce and employ labour to the utmost of your ability consonant with discretion. This was one of the cogent arguments I used with Mr. Lyons in urging a renewal of the agreement last month. You must not ignore that obligation. But the Government, knowing all the facts, has not considered that you were in a position to compete on the world's market with unlimited production and yet secure prosperity for yourselves and decent wages and conditions for the workers. Control is spoken of in the South as some new thing, whilst actually, from time immemorial, control of production to the mill's efficient capacity and accessibility has been the order of the day. **The Government stands for prosperity for the man on the land, which will also secure to the wage-earner in rural industry adequate wages.** The Government recognises that with unlimited production and its corollary—a lower sugar price—there would be a claim for reduced wages and conditions. It astonishes me that many business people support a movement which must affect the district's prosperity, endanger the standard of living of the worker, and affect their solvency. As a matter of fact, I notice on your agenda a motion regarding the Federal Arbitration Court. I will not discuss the matter, except to say that this is indicative of what would happen if sensible control were not exercised in production, in the interests of the producers themselves, the workers in the industry, the business people in the local centre, and the public of Australia.

There is no more justification for a Federal award than there would be to hand Cane Prices Board legislation and administration over to the Commonwealth.

Cabbage Pests and their Control.

By ROBERT VEITCH, B.Sc.Agr., B.Sc.For., F.R.E.S., Chief Entomologist.

THE larvæ of the common cabbage moth occur wherever that vegetable is grown in Queensland, and successful production is rendered possible only by the regular application of insecticides. Two other species of caterpillars may also attack cabbages—namely, the centre grub, which, as its name implies, characteristically feeds in the growing centre of the plant rather than on the opened leaves; and the notorious corn ear worm, a much larger species, which has the habit of burrowing right into the heart of well-formed heads of cabbages. The larvæ of the common species are often referred to as green wrigglers, and as they are far commoner than the other two just mentioned, the moths to which these green wrigglers give rise are generally and rightly referred to as the cabbage moth. The life history, habits, and control of this species will now be discussed in some detail, briefer reference being made to the others in subsequent paragraphs, which will also include a discussion of the cabbage aphis.

Life History and Habits of the Cabbage Moth.*

The moth (Plate 137; figs. 9 and 10) is a small greyish-brown species with a rather pretty wing pattern, the wing spread being about two-thirds of an inch, and the body length slightly less than half an inch. If often occurs in enormous numbers in a cabbage patch, and is readily disturbed in walking among the plants, the moths darting about in short flights. It lays its oval yellow eggs (Plate 137; figs. 1 and 2), which are just visible to the naked eye, on the leaves of cabbages, cauliflowers, and a number of other vegetables, the eggs being laid singly or in pairs on the under surface of the leaves, generally in proximity to the larger leaf veins. After a brief incubation period the very small colourless caterpillars emerge and feed on the under surface of the leaf, the upper surface being left intact. However, as the green wrigglers grow they eat right through the leaf, which may eventually be riddled by numerous more or less circular holes. The larvæ (Plate 137; figs. 3-6) are slender, active green caterpillars, which are rather spindle-shaped and measure about half an inch in length when full grown. Their habit of falling with a jerking motion from the leaves when disturbed and hanging therefrom by a thin silken thread has earned for them the common designation of green wrigglers. The full-grown wrigglers pupate in lace-like cocoons (Plate 137; fig. 7) of great beauty, the pupæ (Plate 137; fig. 8), pale-green at first but later darkening to brown, being clearly visible through the open strands of the cocoons. At the end of the pupal period the moths emerge, and so another generation is initiated.

Control of the Cabbage Moth.

Spraying or dusting with insecticides is essential for the control of this pest, applications being made at frequent intervals—preferably every seven days—when the plants are in the field. As serious damage may be inflicted in the seed-beds, the seedlings should also be treated, and in their case the application should be made every second day. It is necessary to emphasise the fact that one or two applications are unlikely to be productive of any appreciable good; hence the cabbage-

* *Plutella maculipennis* Curt.

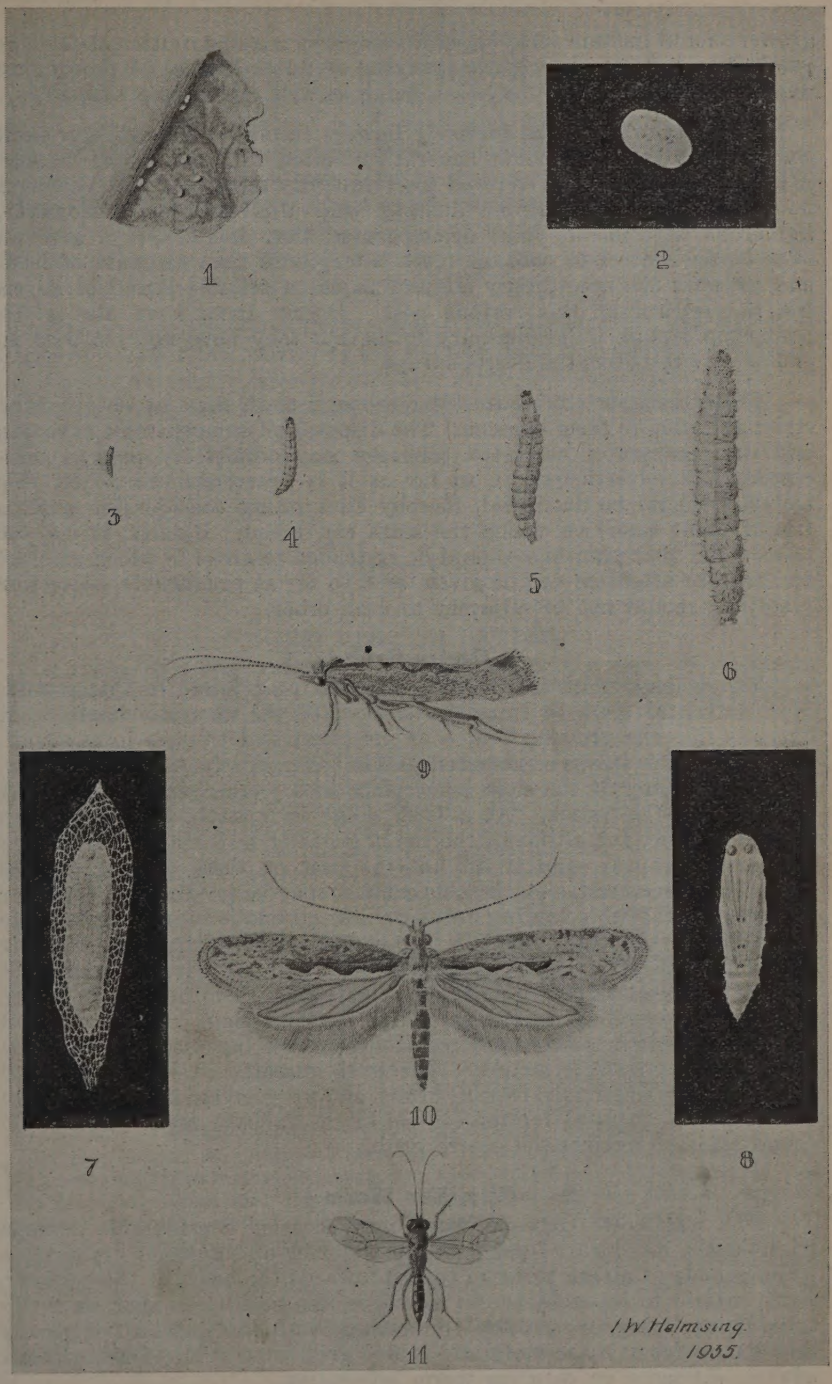

PLATE 137.

Fig. 1. Eggs *in situ* × 5.
Fig. 2. Egg × 24.
Fig. 3. 1st stage larva × 5.
Fig. 4. 2nd stage larva × 5.
Fig. 5. 3rd stage larva × 5.
Fig. 6. 4th stage larva × 5.
Fig. 7. Cocoon × 5.
Fig. 8. Pupa × 5.
Fig. 9. Adult (lateral view) × 5.
Fig. 10. Adult (dorsal view) × 5.
Fig. 11. Larval parasite × 4.

grower should include spraying or dusting as a regular routine in cabbage production. Furthermore, the spraying or dusting must be thoroughly done, the under sides of the leaves being as well coated as practicable.

Arsenate of lead was formerly largely employed for cabbage moth control, but this insecticide has rather fallen into disrepute, because injurious spray residues were all too frequently associated with cabbages marketed after spraying or dusting with this arsenical. However, numerous experiments have demonstrated that derris sprays give an even better control of cabbage moth caterpillars than arsenate of lead, and growers are accordingly advised to use a reliable brand of derris for the control of this serious pest. Derris dusts have also given promising results in preliminary trials, but they have not yet been so extensively tested as the derris sprays.

Some assistance in controlling cabbage moth may be obtained by strict attention to farm hygiene. The disposal of unmarketable cabbages and the residues of marketed cabbages may admittedly present difficulties, but, nevertheless, in so far as it is practicable to do so, this material should be destroyed, thereby eliminating considerable quantities of plant tissue on which the moth can breed. Finally, it may be pointed out that plantings should be restricted to areas to which efficient and regular attention can be given, and, so far as practicable, successive plantings should not be adjacent to each other.

Centre Grub.*

The cabbage moth is in evidence all the year round in Queensland, but the centre grub is primarily a pest of the summer months. It burrows into the growing centre of the plant and tunnels in the main stem, the young leaves of attacked plants being closely webbed together. When tunnelling of the stem takes place in a young plant it generally succumbs to the attack. At a later stage in growth, however, death does not ensue, for although the main growing bud may be destroyed side shoots appear, and if all but the best of these side shoots are immediately removed, a marketable cabbage may be produced. A further feature of this grub's feeding in severe infestations is tunnelling in large leaf veins in the older plants. These tunnels occur in leaves resting on the ground or in close proximity thereto, and soil particles and grass are often webbed together to complete the tunnel. The full-grown centre grub is a pale-yellow caterpillar, slightly more than half an inch in length, the colour pattern being elaborated by the presence of seven brownish longitudinal stripes. The grub pupates in its tunnel, and eventually the small pale, fragile, brown and grey coloured moth emerges. The measures outlined for the control of the cabbage moth will also be found effective against the centre grub.

Corn Ear Worm.†

The well-known corn ear worm may occasion considerable damage in cabbages, more particularly in late summer and autumn, its characteristic mode of attack being to tunnel towards the heart of the cabbage. With respect to its incidence in cabbages, the position is that no really satisfactory spray is available for dealing with this pest, although the derris used for cabbage moth and centre grub control may have a slight adverse influence on corn ear worm infestation.

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* *Oebia undalis* Fabr. † *Heliothis obsoleta* Fabr.

Cabbage Aphis.*

The cabbage aphis is another common cabbage and cauliflower pest, very dense colonies of this insect being frequently found on both surfaces of the leaves, which become malformed and unsavoury in appearance. The young aphids are green in colour, but the older individuals in a colony are greyish-blue insects covered with a white waxy bloom. Like all aphids, this species is a soft-bodied slow-moving insect feeding by sucking the sap of the plant on which it lives, thereby greatly weakening its host, which becomes stunted and sickly, and may even succumb to the attack if the infestation is particularly heavy.

The experiments conducted to test and demonstrate the value of derris sprays for the control of the cabbage moth also showed that these insecticides are highly effective for the control of cabbage aphis; hence the spraying programme for dealing with the one pest should also more or less automatically control the other.

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* *Brevicoryne brassicæ* L.

"PEG LEG" IN CATTLE.

Following is a brief summary of the chief points of a paper by Messrs. A. W. Turner, R. B. Kelley, and A. T. Dann on "peg leg" disease in cattle in North Queensland, and considered at the Science Congress in Melbourne in January:—

It was shown that when the Council for Scientific and Industrial Research in 1931 proposed investigations into cattle disease in North Queensland, one of the major problems urged by the United Graziers' Association was the investigation of that disease of cattle known colloquially as "peg leg." A suggestion had been made by officers of the State Department of Agriculture and Stock that it might be due to insufficiency of phosphorus in the soil and herbage, but proof was lacking. Investigations had revealed that the disease extended over about 13,000 square miles of country in two well-defined areas, one known as the Charters Towers, and the other as the Cloncurry area. The paper discussed the clinical symptoms, post-mortem signs, histology, and bio-chemistry, and the conclusion reached was that the disease was essentially an aphosphorosis, and that insufficiency of protein probably plays only a secondary role. There was thus a great similarity between "peg leg" and the South African disease styfsieckte; in both cases the bony lesions consisted of osteoporosis and osteomalacia. Analysis of soil and herbage had revealed a very low phosphorus content, which was reflected in a low content of inorganic phosphorus in the blood. In order to test (1) the phosphorus deficiency hypothesis, and (2) the effect of giving protein and other supplements to cattle grazing on a "peg-leg" property, a field station had been established on a property, Helenslea, in the Charters Towers area. As to experimental procedure during 1933, when statistically analysed, the controls showed an increase in weight of only 18.6 per cent. during the nine months of experiment, whereas animals receiving dicalcium phosphate showed 47.5 per cent. increase, and those receiving disodium phosphate dissolved in water increased 37.0 per cent. The experiments were partly repeated and extended this year, and were designed (1) to reveal the optimum dose of dicalcium phosphate, (2) to give information on the efficacy and palatability of various phosphatic and other licks, and (3) to investigate the value of the involuntary consumption of phosphorus, as disodium phosphate dissolved in the drinking water.

Prairie Grass Smut.

By R. B. MORWOOD, M.Sc., Assistant Plant Pathologist.

OF recent years prairie grass crops have been seriously affected with smut. So widespread is this disease that all samples of seed examined are obviously contaminated with spores. On this account no grower should neglect to treat his seed before planting.

During the 1934 season the Department of Agriculture and Stock, as reported elsewhere in this issue, conducted experiments to test methods of seed treatment for the control of this disease. Highly satisfactory results were obtained by the use of the mercury dusts Abavit B and Ceresan and of a solution of formalin. Formalin is liable to impair the germination of the seed to some extent, and therefore one of the mercury dusts should be used if obtainable.

Mercury dusts should be applied at the rate of 3 oz. for every 20 lb. of prairie grass seed. The dust and seed should be thoroughly mixed by rotating together in a closed container such as is used for the treatment of wheat with copper carbonate.

Should the mercury dusts be unobtainable then the seed should be treated with formalin, as the advantages of the elimination of disease considerably outweigh the disadvantage due to the adverse effect on germination. This effect can be minimised by care in the treatment. The formalin solution should be made up by adding 1 pint of commercial (40 per cent.) formalin to 30 gallons of water. About a gallon is required for each bushel of seed to be treated. The seed should be spread out on a tight floor or tarpaulin and sprinkled with the solution, shoveled and sprinkled until it is all thoroughly moistened. The seed should then be covered with a tarpaulin or bags also moistened with the solution and left overnight. It should be sown the following day.

TO NEW SUBSCRIBERS.

New subscribers to the Journal are asked to write their names legibly on their order forms. The best way is to print your surname and full christian names in block letters, so that there shall be no possibility of mistake.

When names are not written plainly it involves much tedious labour and loss of valuable time in checking electoral rolls, directories, and other references. This should be quite unnecessary.

Some new subscribers write their surname only, and this lack of thought leads often to confusion, especially when there are other subscribers of the same surname in the same district.

Everything possible is done to ensure delivery of the Journal, and new subscribers would help us greatly by observing the simple rule suggested, and thus reduce the risk of error in names and postal addresses to a minimum.

Report of Cereal Smut Experiments, 1934.

By R. B. MORWOOD, M.Sc., Assistant Plant Pathologist.

DURING the season just concluded a number of experiments were laid down to test the efficiency of various seed treatments for the prevention of the smut diseases of cereals. The diseases worked with were bunt (*Tilletia foetans* and *T. caries*) of wheat also known as ball or covered smut, covered smut (*Ustilago hordei*) of barley, covered smut (*Ustilago levis*) and loose smut (*Ustilago avenae*) of oats, and prairie grass smut (*Ustilago bromivora*). In the case of wheat bunt well-established seed treatments are available to farmers for the control of the disease. The most suitable of these is the use of copper carbonate dust. Further trials with this disease were, however, warranted along two main lines. In conformity with other Australian States the relative efficiency of the different proprietary lines of copper carbonate was tested. A number of mercury dust treatments for which various advantages are claimed by their manufacturers were also tested.

No satisfactory method for the control of covered smut of barley was practised in Queensland prior to the series of experiments on this disease commenced in 1931. The 1934 trials were a continuation of the previous three seasons' work, and reliable seed treatments can be confidently recommended.

The increasing prevalence of the two smuts of oats and inquiries concerning its prevention indicated the desirability of gaining local experience in the effectiveness of various methods of seed treatment which have been advocated elsewhere.

Prairie grass smut has also been of considerable concern to growers, and as no definitely established control measures were known a number of representative seed treatments were tried out. The results obtained were striking, and there is no reason why growers of this crop should produce a smutted product.

The experimental plots were duplicated, one sowing being made at the Roma State Farm and the others on the property of Mr. F. W. Franke, senr., at Nobby. Results were obtained from all plots except the prairie grass at Nobby, which was lost owing to adverse conditions, and the wheat at Roma, in which no smut developed.

BUNT OF WHEAT.

Nobby.

Wheat seed (Pusa-Warren 3004) was artificially smutted by thoroughly mixing crushed bunt balls at the rate of approximately 1 part of bunt to 1,000 of wheat. Samples of the smutted seed were treated in various ways and drill sown in plots 2 chains long, each plot being two drill hoes wide. A space of 21 inches was left between plots. All treatments were replicated three times, except that using standard copper carbonate received from the Victorian Department of Agriculture, which was used as a check and planted every third plot. No exact germination counts were made, but it was reasonably uniform, excepting in the case of bluestone, where it was somewhat delayed, and formalin, which at the strength used destroyed the viability of most of the seed.

Details of Treatment.

Bluestone was used at the rate of 1½ lb. in 10 gallons of water, the seed being immersed for three minutes, then drained and dried. In the

case of formalin the strength was 1 pint of commercial (40 per cent.) formalin to 30 gallons of water, and the time ten minutes. The seed was then covered overnight. Results indicated that this treatment was too severe, and should any grower wish to use formalin it should be sprinkled on the seed and only covered for a period of from two to four hours. Uspulun was used at a strength of 0·5 per cent., and the time of immersion was ten minutes, after which the seed was drained and dried. The dusts were applied at the rate of 2 oz. per bushel, with the exception of one treatment, in which standard copper carbonate was used at the rate of 1 oz. per bushel.

Results.

The number of plants per plot developing smut are given in Table I.

TABLE I.—SMUTTED PLANTS PER PLOT.

Treatment.	Block I.	Block II.	Block III.	Average.
Standard copper carbonate	1	3	1	1·7
Bluestone	5	5	4	4·7
Formalin	0	0	0	0
Standard copper carbonate	1	3	2	2
Uspulun	8	5	4	5·7
Tillantin R.	11	12	10	11
Standard copper carbonate	2	0	3	1·7
Abavit B.	0	1	0	0·3
Agrosan G.	31	18	2	17
Standard copper carbonate	3	0	2	1·7
Cooper's mercurial A.	0	0	..	0
Cooper's mercurial B.	2	2	..	2
Standard copper carbonate	7	0	0	2·3
Aero copper carbonate	14	8	0	7·3
Sickle copper carbonate	12	7	5	8
Standard copper carbonate	3	1	0	1·3
Antibunt	14	3	0	5·7
Untreated	199	225	177	200·7
Standard copper carbonate	3	1	0	1·3
Ceresan U.T., 1875	15	11	1	9
Standard copper carbonate, 1 oz. ..	18	20	1	13
Standard copper carbonate (Average of	all plots)	..	..	1·7

Smutted ears in the untreated plots averaged about 40 per cent. of the total. All treatments used reduced this heavy infection very considerably. The commercial copper carbonates reduced it to under 2 per cent., there being no definitely established difference between the brands tested. They were all, however, somewhat inferior to the Victorian standard copper carbonate. The mercurial compounds Tillantin R and Agrosan G were definitely inferior to the copper carbonates, Ceresan appeared to be slightly inferior, while Abavit B and the two dressings submitted by Messrs. William Cooper and Nephews (Aust.) Ltd. were definitely superior to the commercial brands of copper carbonate, and possibly also to the standard copper carbonate. In the absence of any results from the duplicate sowing at Roma, no great reliance should be placed on small differences between the treatments, and until further tests are carried out it is not considered desirable to recommend any change from the present general method of treating wheat seed with copper carbonate for the prevention of bunt.

COVERED SMUT OF BARLEY.

Nobby.

Barley seed carrying a heavy natural infection with smut was treated in various ways and drill-sown in plots uniformly with the wheat bunt plots alongside. Abavit B, 2 oz., was used every third plot as a check. No exact germination figures were obtained, but observations were made on the stand in the plots. At maturity a careful count was made of infected plants in each plot. With the exception of one of the formalin treatments, a reasonably uniform stand was obtained. The total number of smutted plants per plot is used as the basis of comparison between treatments, the divergence between this method and that using a true percentage infection being considered negligible.

Details of Treatment.

Three different methods of using formalin were tried. For the first, referred to as formalin ten minutes, the seed was immersed in a solution made up by adding 1 pint of formalin to 30 gallons of water. It was left in for ten minutes, then heaped and covered overnight with bags soaked in the solution, then sown next morning. The second, formalin one minute, was treated as the first except that the strength of the solution was 1 pint to 22 gallons and the time of immersion one minute. The treatment referred to as formalin sprinkle was made by turning and sprinkling the seed with formalin 1 pint to 30 gallons till it was thoroughly wetted. The seed was then covered overnight, as in the other treatments. The only other wet treatment was with Uspulun. In this case the seed was immersed in a 0·5 per cent. solution for ten minutes. It was then allowed to dry and planted the following day. The dry treatments were made by thoroughly mixing the seed and the dust in a closed container at the rate indicated—e.g., Abavit B 2 oz. represents a treatment at the rate of 2 oz. of Abavit B per bushel of barley.

Results.

The amount of smut which developed in the plots is shown in Table II.

Table II.—Smutted Plants per Plot.

Treatment.	Block I.	Block II.	Block III.	Average.
Abavit B., 2 oz.	3	2	1	2
Formalin, 10 mins.	0	0	0	0
Formalin, 1 min.	0	1	0	0·3
Abavit B., 2 oz.	6	0	4	3·3
Formalin sprinkle	0	0	0	0
Abavit B., 1½ oz.	15	15	11	13·7
Abavit B., 2 oz.	3	5	2	3·3
Ceresan U.T., 1875, 2 oz.	3	2	3	2·3
Ceresan U.T., 1875, 3 oz.	3	0	2	1·7
Abavit B., 2 oz.	2	5	10	5·7
Agrosan G., 2 oz.	7	22	16	15
Agrosan G., 3 oz.	7	10	15	10·7
Abavit B., 2 oz.	1	4	10	5
Cooper's A., 3 oz.	3	3	0	2
Cooper's B., 3 oz.	3	2	1	2
Abavit B., 2 oz.	7	3	5	5
Uspulun	8	2	6	5·3
Untreated	153	171	170	164·7
Average of all check plots	..	..	..	4

These results will be discussed in conjunction with those of the Roma plots.

Roma.

The experiment on covered smut of barley at Roma was conducted along similar lines to that at Nobby except that the plots were a little larger, being four rows wide and 1½ chains long. Untreated seed was used for the check plots in place of seed treated with Abavit B. The results are set out in Table III.

TABLE III.—SMUTTED PLANTS PER PLOT.

Treatment.	Block I.	Block II.	Block III.	Average.
Untreated	45	45	33	41
Formalin, 10 mins.	0	0	0	0
Formalin, 1 min.	0	0	0	0
Untreated	30	48	57	41
Formalin sprinkle	0	1	0	0·3
Abavit B., 3 ozs.	0	0	0	0
Untreated	13	99	89	70·3
Ceresan U.T., 1875, 2 oz.	0	0	0	0
Ceresan U.T., 1875, 3 oz.	0	0	0	0
Untreated	53	39	12	34·7
Agrosan G., 2 oz.	0	1	1	0·7
Agrosan G., 3 oz.	0	0	1	0·3
Untreated	21	119	54	64·7
Cooper's A., 3 oz.	1	0	0	0·3
Cooper's B., 3 oz.	0	0	0	0
Untreated	55	29	50	44·7
Uspulun	6	4	8	6
Abavit B., 2 oz.	0	0	1	0·3
Average of all check plots ..	..	..	..	49·4

Conclusions.

Previous experiments had demonstrated the efficacy of formalin and Abavit B for the control of barley smut. The experiments under review demonstrated that of the various methods of applying formalin that known as the sprinkle is the best, as it gives very good control of the disease and less germination injury than results from other formalin treatments. Two dusts proved to be equal to or better than Abavit B, the first Ceresan, an organic mercury compound which is being placed on the Queensland market by Dalgety and Co., Ltd., and the second a mercury dust supplied for trial by Messrs. William Cooper and Nephews, but which is not available commercially. With regard to the rate of application of dust, the results do not warrant increasing the dose from 2 oz. per bushel to 3 oz. On the other hand, any lowering of the quantity below 2 oz. interferes seriously with the efficacy of the treatment.

OATS SMUT.

Nobby and Roma.

Algerian oats seed was artificially infected with a mixture of covered and loose smuts and subjected to various treatments. Ten treatments were applied and the seed sown in six blocks of eleven plots, each block containing one plot sown with infected untreated seed as well as one of each of the treatments. Duplicate sowings were made at Nobby and

Roma, the method of sowing and plot sizes being the same as for the wheat and barley smut experiments.

Details of Treatment.

Formalin was used at a strength of 1:240 (1 pint to 30 gallons), the seed being soaked for ten minutes, then covered overnight. Sublimatoform was made up by adding 1 part of corrosive sublimate and 2½ parts of formalin to 1,000 parts of water. The seed was immersed for ten minutes, then dried. Corrosive sublimate was used at a strength of 1:1,000 with a similar period of immersion. In the case of bluestone the strength was 1½ per cent., and the time of immersion three minutes, and for Uspulun 0·5 per cent. and ten minutes. The dusts Abavit B and Tillantin R, Ceresan, Agrosan G, and copper carbonate were used at the rate of 3 oz. per bushel.

Results.

Smut appeared in all the untreated plots when they came into ear. Both covered and loose smut were present, but no figures were obtained for their relative abundance nor for any differential effect that the treatments may have had on the two smuts. All that can be said is that in the case of those treatments for which no smut or only very few smutted plants developed then the treatment evidently had a controlling influence on both smuts.

The results are given below in Table IV. The figures represent the number of affected plants per plot, these numbers being used as the percentage infections were somewhat low and the total number of plants per plot did not appear to vary greatly.

Table IV.—Smutted Plants per Plot.

Treatment.	Roma.			Nobby.			Average.
	I.	II.	III.	I.	II.	III.	
Formalin	0	0	0	0	0	0	0
Sublimatoform	0	0	0	0	0	0	0
Corrosive sublimate	1	1	1	6	9	5	3·8
Bluestone	1	1	1	1	15	0	3·2
Abavit B.	0	0	0	2	1	0	0·5
Tillantin R.	7	3	6	4	10	11	6·8
Ceresan U.T., 1875	0	0	0	2	1	0	0·5
Agrosan G.	2	1	1	5	8	2	3·2
Uspulun	8	10	14	5	10	4	8·5
Copper carbonate	5	5	7	13	11	2	7·2
Untreated	37	31	41	28	26	29	32·0

All treatments reduced the incidence of smut, but Tillantin R, Uspulun, and copper carbonate were definitely unsatisfactory as compared with the better treatments. Corrosive sublimate on its own is inferior to a mixture with formalin or to formalin alone, and has nothing to commend it. Bluestone and Agrosan G appear to be somewhat poorer than formalin, sublimatoform, Abavit B, and Ceresan, but will probably be included in further trials to check this difference. In the meantime it is not necessary to alter the Department's previous recommendation of the use of formalin seed treatment for the control of oats smut excepting to add that the mercury dusts Abavit B or Ceresan may be used if available.

PRAIRIE GRASS SMUT.

Roma.

Prairie grass seed artificially infected with smut was subjected to seven treatments (including untreated) and planted uniformly with the wheat plots. Three blocks each containing one plot of each treatment and one untreated were sown.

Details of Treatment.

Formalin was used at a strength of 1 part in 240 of water, the seed being immersed for ten minutes. The bluestone solution was 1½ per cent. and the time of immersion three minutes. The corresponding figures for Upsulun were ½ per cent. and ten minutes. The dusts Abavit B, Ceresan, and Agrosan G were applied at the rate of 3 oz. per 20 lb. of seed. A fair stand was obtained and a count of mature plants per plot showed more survivals in the treated than in the untreated plots. In the case of the mercury dusts this difference appears significant, and probably is so even after allowing for possible variations in sowing rate due to differences of treatment. The seed following dry treatment or no treatment ran through the drill at an obviously faster rate than the wet-treated, which was swollen and still somewhat moist at the time of sowing.

Results.

The plants per plot surviving to maturity and the smut infection in each plot is given in Table V.

TABLE V.—PRAIRIE GRASS SMUT.

Treatment.	Block I.			Block II.			Block III.			Average.	
	Total Plants.	Smutted Plants.	Per cent. Smutted.	Total Plants.	Smutted Plants.	Per cent. Smutted.	Total Plants.	Smutted Plants.	Per cent. Smutted.	Total Plants.	Per cent. Smutted.
Ceresan U.T., 1875 ..	180	0	0	260	0	0	225	0	0	220	0
Formalin	121	0	0	179	1	0·6	154	0	0	151	0·2
Abavit B.	259	0	0	208	1	0·5	248	0	0	238	0·1
Agrosan G.	157	8	5	225	31	14	147	17	12	176	10·5
Bluestone	171	93	54	159	72	45	129	44	34	153	43·4
Uspulun..	128	65	51	183	110	60	146	83	57	152	56·6
Untreated	136	115	85	76	63	83	151	125	85	121	83·5

The mercury dusts Abavit B and Ceresan gave excellent control of the disease, as also did formalin, though it would appear that the germination had been affected by the formalin treatment. Probably a sprinkle method of formalin treatment would be more satisfactory. The results with Agrosan G were inferior to those with the other two mercury dusts. Bluestone and Uspulun dips were quite unsatisfactory.

STOPPING RAT HOLES.

Soak old newspapers in a strong solution of soda and hot water and squeeze it to a pulp. This will set like cement, and rats and mice will not eat it.

An Introduction to Beekeeping.

By HENRY HACKER, F.R.E.S., Entomologist.

THE feeling that there is room for expansion in Queensland beekeeping has been reflected by the numerous inquiries addressed to the Department of Agriculture and Stock during the last year or two, many of these being from persons possessing little or no experience of the subject.

This article has accordingly been compiled in order to meet the demand for information, and provides the prospective beekeeper with a concise account of those phases of the industry regarding which most of the inquiries have been received, such as the names and uses of the essential articles of apiary equipment, or the methods of commencing an apiary and handling the bees.

A portion of the matter contained herein has been previously published in the form of leaflets issued by the Department, but by far the greater part of the text has been specially written for this article.

As it is not possible within the limited space available to give minute details on many of the manipulations, technique, and so on, these notes may be considered as introductory, and when some experience has been acquired the beginner should consult one of the larger text-books on the subject, wherein he will find more detailed information to augment that which is given here.

All the methods recommended have been tested by leading beekeepers in this State, and have been found suitable for Queensland conditions. The reader who wishes to keep bees may therefore proceed with confidence in the knowledge that he is following proved methods which will greatly enhance his ultimate prospects of success.

SECTION I.—THE HONEY BEE.*

Introduction of Honey Bees to Australia.

The first reference to bees in Australian records occurs in a letter from Gregory Blaxland dated 1st March, 1805, asking for cargo space on the "William Pitt" for a "swarm of bees in cabin with wire cage over the hive." There is, however, no record of their safe landing. The first record of the actual introduction of bees occurs in a letter from Samuel Marsden to the secretary of the London Missionary Society, in which he mentions that on his way back to the colony in the ship "Ann" he purchased at Rio de Janeiro two hives, which were safely landed on 27th February, 1810, and placed in the garden of Government House in Sydney.

In March, 1822, Captain Wallace, of the "Isabella," brought in a number of hives, and the first swarming is recorded as taking place in the following October. These black or English bees have since spread over the entire continent, and are now locally known as the bush bee. The Italian race, *A. mellifera* var. *ligustica*, was introduced between the years 1874 and 1878, and the so-called hybrid is a cross between the black and the Italian races. The Italians, and even the hybrids, have shown themselves so far superior to the black bees as honey-makers that the great majority of beekeepers consider all discussion as to their

* *Apis mellifera* Linn., 1758 (= *mellifica* L. 1767).

respective merits to be at an end. Italians, where the race is still pure and not enfeebled by interbreeding with light-coloured bees, are superior to any other kind, and may be safely recommended to those who propose to keep bees, either as a commercial proposition or merely as a hobby.

Adaptability of the Honey Bee.

Honey bees occur in every country throughout the world which possesses a flora sufficiently varied for their needs. They have also adapted themselves to every kind of climate ranging from the tropics to near the Arctic Circle. The success of the honey bees as colonists under such varying conditions is due to their habit of storing large quantities of honey, and also to their ability to generate heat from their food and thus maintain a rather high temperature in the hive during periods of cold weather, and conversely to reduce it when necessary by fanning with their wings, thus keeping an even temperature within, irrespective of the conditions prevailing outside.

Sense of Smell.

Bees also possess a highly developed sense of smell, which is of the greatest importance to them in their various activities, and a number of distinct odours are present in the hive, such as the colony odour, the individual odour, the brood odour, the wax odour, and the honey odour. The hive odour is composed of a mixture of these, and every member of a colony, besides its individual odour, carries the hive odour which is the chief means of mutual recognition between bees belonging to the same colony.

An appreciation of the part that odours play in the behaviour of bees is of considerable importance to beekeepers, because the introduction of queens, uniting colonies, and various other manipulations may all be performed more successfully in the light of such knowledge.

The Comb.

Bee comb consists of six-sided wax cells, sloping slightly upward from the base to the mouth, a midrib of wax forming the base of the cells on both sides of the comb. The worker cells measure about one-fifth of an inch, and the drone cells about a-quarter of an inch between their parallel sides. Honey and pollen are stored in worker and drone cells. Other cells, called queen cells, are sometimes present in a hive when the bees desire to rear a fresh queen. These cells are much larger than worker or drone cells, more or less pitted on the surface, about an inch long, and are usually attached to the outer edges of the comb.

The Brood.

The eggs, larvæ or grubs, pupæ, and the young bees before they emerge from the cells in which the eggs were laid are called the brood. The eggs are minute banana-shaped objects, which are attached by one end to the base of the cell. They hatch after an incubation period of three days and the bee larvæ then appear. At first the young larvæ are curled round at the bottom of their cells, but when they have nearly completed their feeding period they are stretched out to their full length with their heads towards the mouth of the cells. At this stage the larvæ receive their last meal, and the bees begin to seal the cells with a thin cap of porous wax and pollen, through which the larvæ are able to breathe. Occasionally there are exceptions when the cells are left unsealed, although the cell walls are slightly extended and the opening

contracted. This condition is called bareheaded brood by beekeepers, and its occurrence is of no consequence, for the bees develop within just the same as if the cells were sealed.

After the cells are sealed the larvæ line the interior with a delicate silken cocoon, and then change into pupæ, which at first are white but gradually become darker, until the metamorphosis is complete about the nineteenth day after hatching; the young bees then shed their pupal skin and gnaw their way out of the cells.

Worker Bees.

The worker bees are responsible for all the work of the hive, the various duties being carried out by bees of different ages. The life of the worker may thus be divided into three periods.

First Period.—The newly-emerged bees clean out and polish cells for the reception of the eggs, and also help in maintaining the right temperature of the hive. After the second day, feeding of the older larvæ with honey and pollen is taken over, and this goes on until the sixth day. From the sixth until about the fifteenth day the brood food glands are functionally active, and the bees of this age consequently devote themselves to feeding the very young larvæ. By the end of this time these glands tend to atrophy, and brood-feeding by these particular bees ceases.

Second Period.—This is begun with their first flight from the hive, and for short periods in the middle of the day they may be seen flying in ever-widening circles around their hive while orienting themselves—that is, memorising their home or the place where it stands. Each day their flight is extended until they have learned the landmarks for a considerable distance around. During this period the bees also receive and store nectar from the foraging bees; they attend to the pollen brought in and act as general workers in the hive. Bees of this age have their wax glands in the active secretory phase. Towards the close of this period, which lasts about ten days, the bees take on the duty of guarding the hive entrance.

Third Period.—In this period, which is from twenty to thirty days' duration during the summer months, the workers are active only in the field, and are engaged in foraging for water, pollen, and nectar. They continue this work until the end of their normal life of a few weeks; sometimes it is very much less, as strong winds, cold showers, insectivorous birds, and insect enemies all take a constant and heavy toll of the field bees.

Drones.

The male bees or drones do not perform any duties within the hive, and are not even able to feed themselves, but depend upon the workers to give them food. Their one function in life is to mate with the virgin queen when on her mating flight. For this purpose they are supported in some numbers by prosperous colonies during the summer months, but at the end of the season the behaviour of the workers towards them undergoes a change. One day they leave as usual for their daily flight, but are prevented by the workers from re-entering the hive, with the result that they quickly succumb to hunger and cold. They may be readily distinguished from the workers by their greater size, their large eyes, and the absence of a sting.

Queen Bees.

The queen bee is the most important member of the hive, for upon her fecundity depends the prosperity of the colony. When the queen's eggs are fertilized they develop into workers or queens according to the way the larvæ are fed, but when unfertilized, into males or drones, as is also the case with the eggs that are sometimes laid by workers.

The fertilized queen bee is somewhat similar to the worker-bee, but her reproductive organs are much more developed. She may, however, be easily separated from the other bees in the colony by her length, which is about one and a-half times that of the worker. Her wings do not extend to the end of the abdomen, which is long and tapering, and she differs from the workers in several other respects; she has no pollen-gathering apparatus, and her sting is not barbed like that of the worker-bee, but is somewhat curved and is chiefly used as an ovipositor, although she also uses it in destroying a rival. She varies from a golden to a brown colour, and as she grows older the colour darkens.

The queen goes out on her mating flight, as a rule, within the first five or seven days after she has emerged from her cell. She leaves the hive and mates with a drone high in the air, and after a successful flight she returns with the organs of the drone remaining attached to her body. She quietly enters the hive, and on the following day she will generally commence to deposit the enormous number of eggs necessary for the production of the young bees, which are continually required to keep the colony in a prosperous condition.

The number of eggs laid by a queen varies from time to time, being regulated by the requirements of the colony, or the space available. During the period of maximum activity in the early summer the queen will lay as many as 2,000 eggs within twenty-four hours. The average life of a queen is about three years, and she reaches the peak of her egg-laying capacity in the first season, after which she deteriorates. From this time on the colony will gradually diminish in numbers until she is replaced by a young queen.

SECTION II.—PRODUCTS OF THE HIVE.

Honey.

Nectar is the raw material from which the bees manufacture honey, and consists chiefly of a solution of sugars with small amounts of other materials, including colouring matter, and those ingredients which give to honeys their characteristic flavours.

The field bee derives its supplies from the successive blooms of a great variety of trees, shrubs, and other cultivated and wild plants, of which those belonging to the order *Myrtaceæ*, which include the Eucalypts, are by far the most important in this State

When first gathered, nectar is a thin, watery liquid possessing a raw, rank taste, and one of the functions of the worker bee is to transform this raw product into the wholesome and delicious food which honey constitutes.

There have been two theories offered to explain how the honey bee reduces the high water content of nectar to the low water content of honey; these are known as the excretion and the evaporation theories. The first of these is based largely upon the well-known observation that bees carrying nectar often eject a tiny spray of colourless liquid. This was assumed by some of the earlier observers to be the result of a process

within the body of the bee, whereby some of the excess water was eliminated from the nectar while the bee was carrying it to the hive. Largely as a result of recent experiments in the United States of America it is now known that the evaporation theory is the correct one, the evaporation of nectar being carried out within the hive. The nectar-carrying bee, upon her return from the field, delivers her load to one or more house-bees, which then put the nectar through a process of kneading with their mouth-parts, which apparently reduces its water content and probably permits the addition of enzymes, such as invertase, which are produced by the salivary glands. It was also observed that instead of depositing the entire load in a single cell, the house-bee often distributes it by attaching a small hanging drop to the roof of each of several cells; these small hanging drops present relatively large surfaces, from which moisture can evaporate rapidly. Later the droplets are collected, and it is assumed that they are again put through the process of manipulation by the mouth-parts.

The evaporation of the nectar is carried to a further stage by worker-bees, which station themselves in line near the hive entrance. These, by the continual buzzing of their wings, drive currents of air into and out of the hive and over the comb surfaces. If the hand is held before the entrance at such a time a strong current of warm air may be felt coming out. The loud buzzing heard at night during the summer time is due to the wings of workers engaged chiefly in ripening nectar. When finally this process is completed, it is found that the water content has been reduced to about 15 to 20 per cent., and that the disagreeable odours and flavours, probably due to volatile oils, have also been driven off. The finished product is stored in cells above and around the brood nest and the main cluster of bees. The work of sealing with waxen caps then goes forward rapidly, the covering being more or less porous. This sealing of the cells indicates to the beekeeper that the honey is ripe and in the right condition for extraction.

Ordinarily, honey is judged by its colour, flavour, and density. The very great range in its colour is due entirely to the sources from which it is obtained. The colour varies from almost white, through straw and amber to reddish. It has been known to be blood-red, and again to have a greenish tinge, and still be absolutely pure. The aroma and flavour of the honey also varies very considerably. White clover and lucerne honeys are generally admitted to a preference as to appearance and flavour, although many people who are used to the more strongly flavoured eucalyptus honeys consider the former to be rather insipid. It must be noted, however, that lightness of colour alone is no conclusive evidence of superior quality, and honey of the darker colours, as well as honey of the lighter colours, may be of the higher grades and quite suitable for table use. Some of the most prized honeys—as, for instance, that gathered from orange blossoms—is of a very deep colour, while the famous heather honey of Europe is quite dark, and yet no honey stands higher in popular esteem on that continent.

Honey is marketed in three principal forms—extracted or liquid honey, which has been separated from the uncrushed comb by centrifugal force or gravity; comb honey contained in the cells of comb, usually in 1-lb. sections; chunk honey, which is sometimes retailed here, in which comb is cut into rectangular pieces and placed in the container with the liquid honey, which, if packed in glass, increases the attractiveness of its appearance.

Most of the honey is marketed in the extracted form. Bees are ordinarily able to produce a larger quantity of honey if they are not compelled to build comb for it, and by emptying the combs and replacing them in the hive the bee is able in periods of heavy nectar secretion to proceed immediately to the storage of more honey.

The production of comb honey requires much greater skill and experience on the part of the beekeeper, and can only be carried out successfully in limited areas where the conditions are favourable. It should not be attempted in localities where the honey flow is slow or intermittent, where the character of the honey flow is such that it granulates quickly in the comb while it is on the market, or where the honey is dark in colour. Local market conditions in some instances may, of course, be such as to make it seem advisable to produce comb honey in limited quantities in a locality that is not well suited to comb-honey production, but the beekeeper who expects to produce comb honey for the general market should first be sure that his is a comb-honey locality.

Almost all honeys granulate or candy after a certain time. Those which are high in dextrose or grape sugar will granulate very quickly after being exposed to the air by extraction. Granulation is hastened during periods when there is the greatest difference between day and night temperature. Conversely, the liquid condition may be maintained best by exposure to moderate heat; for instance, a honey which ordinarily granulates quickly may remain liquid for years if stored under a roof exposed to the sun. For this reason storekeepers commonly keep their stocks on the warmer top shelves of their stores.

Beeswax.

Beeswax is secreted by special glands in honey-bees of a certain age, these glands being situated on the ventral surface of the abdomen. A reasonably high temperature and a honey flow are necessary for its production. If the bees are closely watched under these conditions, little pearly discs of wax somewhat resembling fish scales will be seen protruding from between the segments on the underside of the abdomen. These wax scales are scraped off with the spines of one hind leg, then pushed forward and grasped by the front legs and transferred to the mandibles, where they are manipulated or masticated, after which they are applied to the comb. During the process the bee stands on three legs, the two intermediate legs and one hind leg not in action, while the other hind leg and the two fore legs, in connection with the mandibles, perform the manipulations. Each individual bee removes its own wax scales without any assistance.

At the time a swarm is hived there is no wax in the hive under natural conditions. The wax secretions, however, become very active, and in an extremely short time the hive is supplied with combs. It is also true, of course, that wax is secreted at any time during the active season, when it is necessary that more combs be built to accommodate brood or stores, provided, of course, that there is room. If a comb is removed from the centre of the brood chamber or from the super, it is replaced as needed, but, as a rule, not so rapidly as in the case of a newly-hived swarm. The rapidity of the honey flow influences this wax secretion greatly.

Notwithstanding the fact that wax is a more valuable article than honey, it pays the beekeeper of to-day to produce honey in preference to making the bees expend their energies in the production of wax.

With modern methods of extraction the honey is removed from the combs, and these are again given to the bees or carefully stored away for use during the following season. The wax which the beekeeper now obtains results from the melting-up of cappings, old combs, or combs exhibiting faults, such as stretched cells, or those having too great a proportion of drone cells.

Beeswax has many uses, both in the arts and in commerce, and fresh uses are continually being found for this product. A very satisfactory floor finish can be made by melting 1 lb. of beeswax, and while it is cooling stirring into it some turpentine, the proportion varying according to whether the mixture is required to be thin or thick. Certain grades of blacking, harness oils, and lubricants require pure beeswax in their manufacture. Large quantities of beeswax in the form of candles are used in churches. The electrical supply business is a large consumer, for the windings of the electric wires are soaked in beeswax to prevent their being affected by extremes of heat or moisture. Even the dental profession consumes large quantities every year to take impressions in the mouth. Last, but not least, the beekeeper himself is a large consumer as well as a producer of wax.

Pollen.

Pollen is the reproductive substance of flowers, which is transferred from the male to the female portion of the flower, or from the male flower to the female flower for the reproduction of the species. Nature has provided various methods for this transfer. Amongst these are flying insects, of which bees are the principal. Pollen is highly nitrogenous and contains vitamins necessary for the development of the bee brood. Nature is always prolific, and provides more than is necessary for reproductive purposes. Bees, as they visit flower after flower, carry the pollen from the anthers and fertilize the styles. In doing this they take a toll for their service, and carry some of the surplus pollen away to their hives to make food for their young larvæ. When breeding is taking place, the nurse bees convert honey and pollen into chyle food, which is deposited in the larval cells. Pollen is generally yellow or orange in colour, but it may be other colours, such as white, green, or blue, according to the source from which it is obtained.

Pollen may be collected by the worker-bee upon its mouth-parts, upon the brushes of its legs, and upon the hairy surface of its body. When the bee collects from small flowers, or when the supply is not abundant, the mouth-parts are chiefly used for gathering it. The specialised brushes on the legs are used to remove the pollen grains from the body and transport it to the pollen baskets on the hind legs.

The pollen grains are slightly moistened with honey to make them cohesive, and after the load has been carried to the hive it is deposited by the bee within one of the cells of the comb. It is then packed in the cell by some other worker, whose duty it is to flatten out the rounded masses and add more fluid to them.

Propolis.

Propolis is known to every beekeeper under its commercial name of bee glue. Its source has been questioned recently, but it is generally supposed to be collected by the bees from the waxy bud scales and other parts of various trees. In any case, the bees bring it in from the field in much the same manner as pollen. Their uses for it are many; with it the frames are cemented in place, the covers and bottom boards are

glued fast to the hive body, the hive entrance is contracted, and cracks are stopped against cold draughts and robber bees. During a recent inspection tour, mounds of propolis were seen on the floor of several hives, and a further examination showed a dried mouse under each mound. The mice had evidently crept into the hives and had been stung to death by the bees, but finding that the bodies were too heavy to drag out, the bees had sealed them to the floor of the hive with a thick coating of propolis. Because it liberates a very pleasant odour while burning, it sometimes serves as a sort of incense, especially for church rites. Much propolis is said to be used in Europe and elsewhere for this purpose, but there is no market for the substance in Queensland.

SECTION III.—APIARY EQUIPMENT.

The Hive.

A hive, in order to meet the requirements of the Apiaries Act, must contain moveable frames which may easily be lifted out for inspection. A properly constructed frame hive also embodies the important feature of a bee-space. This is usually regarded as a quarter of an inch separating the various portions of the hive. Father Langstroth made the discovery that bees recognise and protect passageways which are now called bee-spaces. All who preceded him failed to grasp the fact that bees would leave such spaces unfilled with wax or propolis. Before Langstroth's time it was necessary to pull out frames stuck fast to the hives with propolis, or tear or cut loose the combs with a thin-bladed knife before they could be removed for the purpose of inspection. Modern hives are designed with a bee-space of one-quarter of an inch surrounding the frames on every side, and although they may be of different sizes to accommodate a varying number of frames, they all possess this feature of a bee-space.

When the size of the hive to be used is decided upon, that size should be strictly adhered to, as uniformity in this respect will save much trouble and loss of time when manipulating the colonies. As the great majority of the hives used in Queensland at the present time consist of the ten-frame Langstroth hive, that size may be considered standard here, as it is in the United States. The measurements given below apply to hives of this size.

The modern Langstroth hive (Plate 138) consists of the following parts:—A floor or bottom board; a brood chamber or hive body in which ten brood frames hang from metal rabbets near the top; a super or honey chamber, which is identical in measurements to the brood chamber, in which the field bees store honey; a thin covering known as the inner cover, and, in addition, a telescopic cover with a metal roof, which is added to give the bees extra protection from weather conditions.

The hive body is a box without top or bottom. The dimensions are 19⅛ inches by 15⅛ inches inside measurements, the height being 9½ inches, and it is made of ⅞-inch timber. The joints of the body are dovetailed, which makes it exceptionally strong. Metal rabbets for suspending the frames are preferable to wooden rabbets, because the frames slide easily along them, and the bees are less likely to glue the frames to the metal.

The bottom board or floor is a plain board 22 inches long by 16 inches wide by ⅞-inch thick. Fastened to the upper surface of the board are three slats ⅞-inch wide by ¼-inch thick, the slats being otherwise of the same dimensions as the hive body. This arrangement leaves an

PLATE 138.—A WELL-CARED-FOR APIARY.

entrance at the front ¼-inch deep, this entrance extending the full width of the hive.

A hive cover should keep the inside of the hive dry and prevent the extremes of heat and cold affecting the bees from the top. The pattern which seems to meet those requirements best is a flat cover telescoping over the top of the hive body and extending down the sides of the hive for 2¾ inches. This cover consists of a rim of ⅜-inch wood, to which ⅜ or ½-inch boards are nailed, which in turn are covered by galvanised iron turned down over and nailed to the side of the rim. The rim should be ¼ inch longer and a ¼ inch wider inside than the outside of the hive. Layers of paper are placed between the boards and the galvanised iron of the cover to act as insulating material.

With this type of hive cover it will be advisable to use an inner or super cover board, which is an inner cover made of thin boards fastened to a frame the full size of the hive body, although a sheet of three-ply will serve the same purpose. If no inner cover is used the bees will glue the cover to the frames with propolis, making it difficult to remove, while the jarring caused by levering off a stuck cover angers the bees and incites them to sting. The wide-spread practice of placing a hessian bag between the frames and cover is not recommended, because it fills the bee-space and forms a safe hiding place for wax-moths, ants, and cockroaches, as the bees cannot enter the small spaces to clean them out. Furthermore, bags or pieces of hessian absorb water and conduct it into the hive at the edges, sometimes causing warping of the hive walls as well as mouldy combs.

The frames (Plate 139, fig. 3) are suspended inside the hive bodies, so that there is ¼-inch bee-space between the top of the frames and the cover. A similar bee-space is provided at the ends by making the frames ¾ inch shorter than the inside length of the hive.

Many different patterns of frames are in use, those known as self-spacing—that is, provided with projections at the sides to preserve the bee-space between each frame—being the most useful. Although any person who is handy with tools can make serviceable hive bodies, covers, and bottom boards, home-made frames are not recommended, as the machine-made frames are turned out more cheaply and much more accurately than they could be produced by hand.

Painting all hives before use protects them from weather and greatly lengthens their life. White paint is usually desirable, because it helps to prevent excessive heat in the colony during hot weather. It is also recommended that the ends of all hive-boards receive a coat of raw linseed oil before nailing together, as this will prevent timber decay, which will attack the ends of boards more quickly than the sides.

A queen excluder (Plate 144, fig. 6) is a sheet of zinc with perforations of a definite size, large enough to permit the passage of the workers, but too small to allow the passage of the queen. It is placed on top of the brood-body, with the result that the queen is prevented from travelling into the super or upper story to deposit her eggs, from which brood would be produced. It should be stated, however, that there is some diversity of opinion among the beekeepers with regard to the use of a queen excluder. Those against its use maintain that it prevents the free passage of the bees into the super and hinders the proper ventilation of the hive, with the result that the activity of the bees is lessened and many bees are employed in ventilating the hive when they might be gathering

PLATE 139.

Fig. 1. Embedder.
Fig. 2. Sheet of foundation.
Fig. 3. Wired frame.
Fig. 4. Reel of wire.

honey. Until the beginner is adept in the manipulation of his bees and acquires a good knowledge of their habits, it is advisable for him to use the queen excluder; he can discard it later if thought advisable.

Comb Foundation.

Comb foundation (Plate 139, fig. 2) is just what its name signifies, being the base, midrib, or foundation of honeycomb. If a piece of comb be taken and sliced down on both sides nearly to the bottom of the cells, all that is left is the foundation of the comb, hence the name. In commercial beekeeping, ready-made foundation comb is prepared by passing a thin sheet of pure beeswax between a set of rollers, the surfaces of which have been stamped or engraved in such a way as to give the imprint of the natural base of the honeycomb itself. Bees will utilise this man-made article and construct it into perfect all-worker comb within two or three days during a good honey flow. The advantages of using full sheets of foundation in the frames instead of allowing the bees to build comb in their own way are—firstly, a stronger force of worker bees and very few drones will be produced; secondly, faster building of the combs for brood and the storage of honey is ensured; and, thirdly, stronger and straighter comb is built.

Some beekeepers use only narrow strips of foundation comb known as starters. These, however, are not recommended, because they are not of much help, as the bees will still have to make a large amount of wax. The resulting comb will also contain a large proportion of drone cells, which is not desirable.

Each frame, after being nailed together, should have four small holes drilled through the middle of both sides at an equal distance apart. A single piece of fine wire (Plate 139, fig. 4) is fastened to a tack driven almost in close to the first hole, and is then threaded through the eight holes in such a manner that four horizontal wires stretch across the frame. The wire should be pulled tight and kept taut by winding the loose end round the head of a second tack driven in close to the last hole. Then turn the wired frame upside down and fit the sheet of foundation in with its edge close to the top bar. A vessel of hot wax and a teaspoon should be close at hand. Next tilt the frame and pour a little hot wax along the angle formed by the top bar and the foundation comb. The wax, when set, will firmly cement the sheet to the top bar. Special implements have been devised for this purpose, but a teaspoon is always at hand and is convenient for pouring the melted wax. The sheet of foundation is fastened to the wires with a tool called an embedder (Plate 139, fig. 1), which consists of a small serrated wheel on a handle, the wheel being run along the wires, thus pressing them into the wax. If the sheet of foundation is fastened into a frame in a cool temperature it will certainly buckle and warp out of shape when placed in the warm interior of a hive. To ensure nice, regular comb being built, foundation work should therefore be performed in a heated room.

The Honey House.

A few remarks are necessary on the honey-house, or the place where the honey is extracted. It should be so arranged that no bees can enter it when attracted by the odour of the honey. The window apertures should be covered with a piece of gauze, which is continued for about 6 inches above the top of the window, on the outside, and ¼ inch from the wall. Bees almost always crawl upward, and those stragglers which

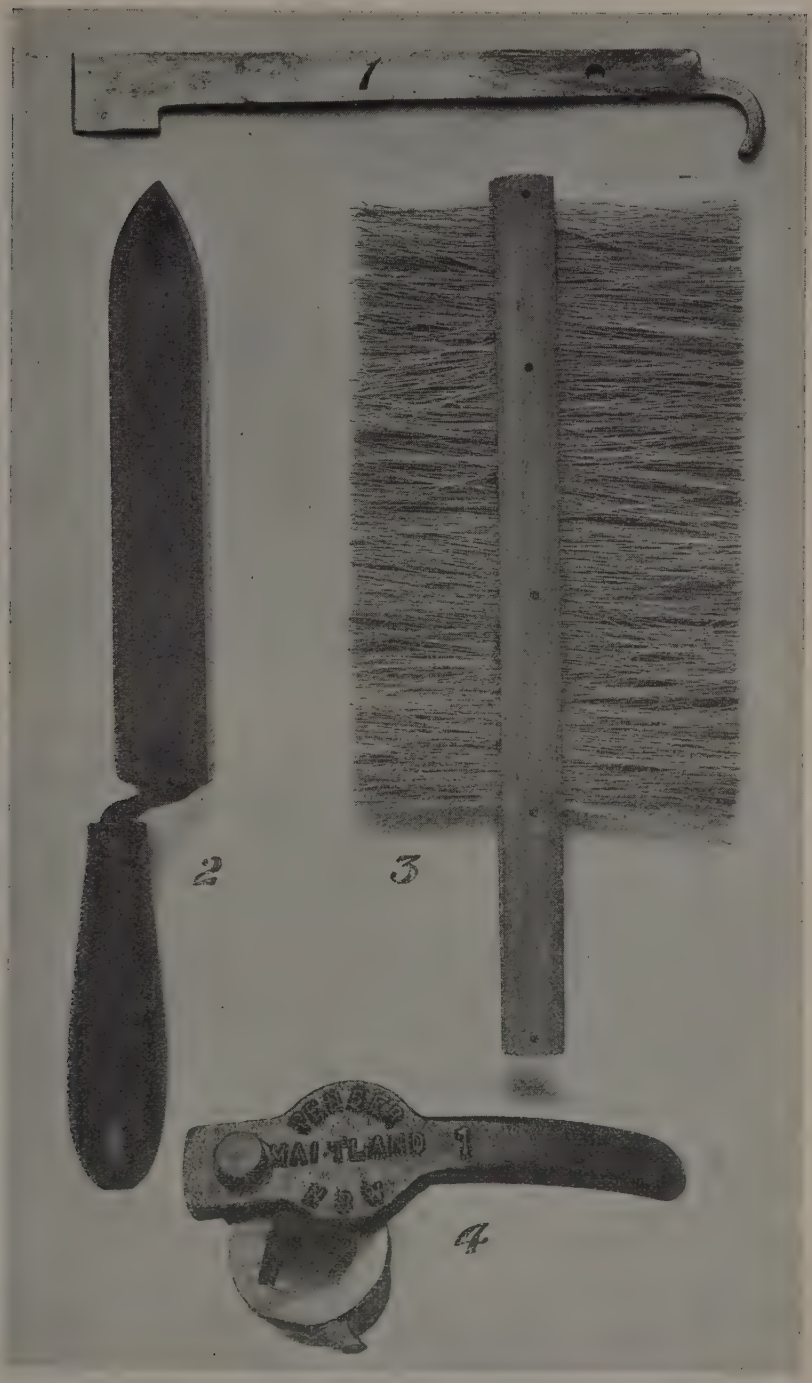


PLATE 140.

Fig. 1. Hive tool.
Fig. 2. Uncapping knife.
Fig. 3. Bee brush.
Fig. 4. Honey gate.

have gained access to the honey-room on combs, &c., will crawl up the wire gauze and out of the opening, but other bees will not try to get in that way. That the extracting room be bee-tight is practically the only absolute requirement. Honey should never be extracted in the open air, except during a heavy honey flow, when bees are not inclined to rob.

For the construction of the honey-house, hardwood and galvanised iron is recommended, and if the apiary is on sloping ground the building should be placed at the lowest corner. A barrow full of honeycomb ready for extraction is of considerable weight, and it saves labour to use a down grade. A great deal of heavy lifting is saved inside the honey-house by using the gravitation system. The cappings melter and extractor should be placed on a platform raised several feet above the floor, high enough to allow the honey to run into a tank placed on the floor. A well is dug below the gate of the tank sufficiently deep to accommodate the 60-lb. tins used when filling from the tank.

Further ideas for the improvement of the honey-house will doubtless occur to the progressive beekeeper. A cement floor on a gentle slope ensures freedom from dust and facilitates cleaning. A wooden runway on which to slide the supers of comb through a hanging door covered with wire gauze saves much lifting and prevents the entrance of many bees. If room permits, a workshop with a carpenter's bench built at one end of the honey-house makes a comfortable place, where the owner can assemble and paint hive parts, wire frames, and do many other jobs which are necessary in an up-to-date apiary.

Requisites for Handling Bees.

Everybody handling bees requires a veil, smoker, and hive tool. A suitable veil may be made from about a yard of black brussels net sewn up to form a cylinder with the hem turned at both ends. This allows elastic to be threaded through, making the top fit snugly on the crown of the hat. Black permits a better vision than white net and is not so trying to the eyes.

The smoker (Plate 142, fig. 1) is simply a metal fire box attached to a small pair of bellows. It is easily lighted, and should always be at hand ready to subdue any bees showing fight. Many materials may be used for fuel, such as pieces of old chaff bags, wood shavings, fibrous bark of stringy-bark trees, or rotten wood.

Some sort of hive tool (Plate 140, fig. 1) is also required, and for this purpose many beekeepers use a screwdriver, a chisel, or even an old knife, but a specially-made tool is best. It is used to lift or ease any portion of the hive that gets stiff with wax. Any burr comb—that is, pieces of wax built about the frames by the bees as braces—may easily be removed with this tool.

Requisites for Extracting Honey.

The combs from which the honey is to be extracted are removed from the colony and shaken, a slight upward movement of the frame, followed by a quick reversal and downward shake, resulting in dislodging the greater proportion of the bees. As combs filled with sealed honey cannot be shaken sufficiently vigorously to remove the remaining bees owing to the risk of breakage, the bees that still remain after the first shake have to be brushed off with a soft, specially made brush called a bee-brush (Plate 140, fig. 3). A bunch of grass or weeds will, however,

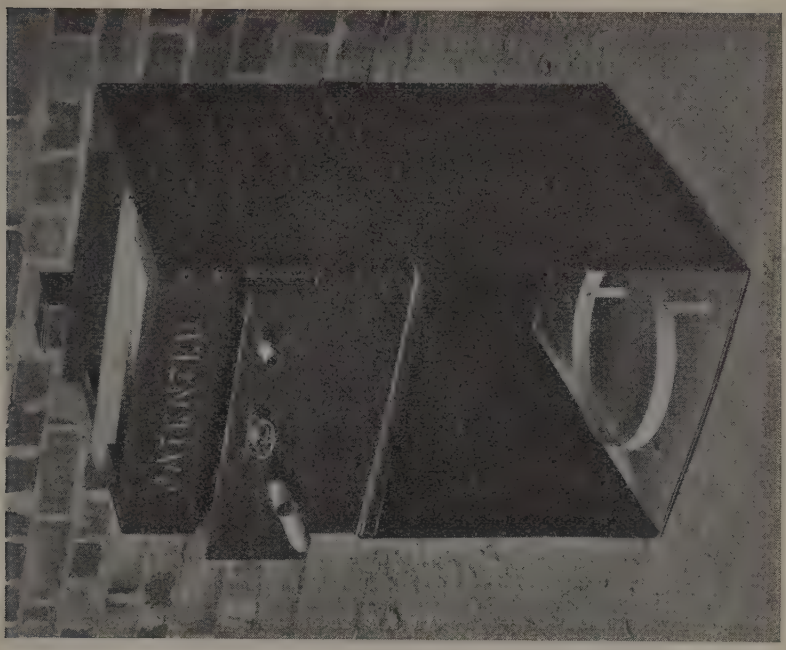


Fig. 2. Beuhne reducer.

Fig. 1. Honey extractor.

PLATE 141.

usually serve the purpose just as well. The only advantage of a brush is that is it always ready for use. Some form of covered carrier should at once receive the combs when freed from bees, and this comb-box may be conveniently mounted on a wheelbarrow. Empty supers can be used as a comb-box.

As a first step in extracting the honey from the combs it is necessary to slice off the wax cappings by means of an uncapping knife (Plate 140, fig. 2). The combs should be uncapped and extracted while still warm from the hive, and the bevelled edge of the specially constructed knife should be kept as sharp as a razor to prevent bruising or crushing the sides of the cells. When using the knife the bevelled side should be next to the comb and the severed cappings allowed to fall over the unbevelled face of the knife. The work of uncapping is also greatly helped if the knife is kept immersed in hot water between uncapping each comb.

Two uncapped combs of about equal weight should be selected for balancing in a two-frame extractor in order to reduce the vibration. They are then placed in the comb-baskets of the honey-extractor (Plate 141, fig. 1) when by turning the crank-handle the baskets are revolved round a central shaft inside a cylindrical metal tank, and the honey is thrown out from one side of the combs against the side of the tank by the centrifugal force produced. The combs are then reversed and the turning process repeated. The frames are now ready to put back in the hive, where they are quickly licked dry by the bees and any minor damage repaired. Larger honey extractors capable of handling as many as forty-two frames at once are available.

Newly extracted honey should be permitted to stand in a tank for a few days, so that the air and froth which go through the strainer which constitutes a part of the tank may come slowly to the surface. The clear honey may then be drawn off from below and tinned. A suitable storage container for honey may be improvised from a clean, empty petrol drum by inserting and soldering a honey-gate (Plate 140, fig. 4) near the bottom of the drum. There are several machines called reducers or cappings-melters (Plate 141, fig. 2) for automatically separating the honey which is associated with the wax in the cappings removed by the uncapping knife. Although differing in detail, they all work on the same principle, namely, by melting the wax, and by using the difference in the specific gravity of heated honey and wax to separate them through different outlets into two separate vessels. A cappings-melter is also convenient for melting the honey-comb from box-hives, or that taken from bee trees. The saving in time effected by the cappings-melter is so great that in a little while its use must become universal wherever extracted honey is produced.

Sections and Separators for Comb Honey Production.

There are two general styles of section in common use differing in the method of spacing, the bee-way section (Plate 143, fig. 3) in which the greater part of the bee space is provided by the section itself, the rest of the bee space being formed by the separator, and the plain section (Plate 143, fig. 4) in which the whole of the bee space is provided by the separator; each style has its advocates and each offers some advantages. The standard size of both bee-way and plain sections is $4\frac{1}{4}$ inches square, but the width is $1\frac{3}{8}$ inches in the former and $1\frac{1}{2}$ inches in the latter. The extra width in the bee-way section is for the purpose of

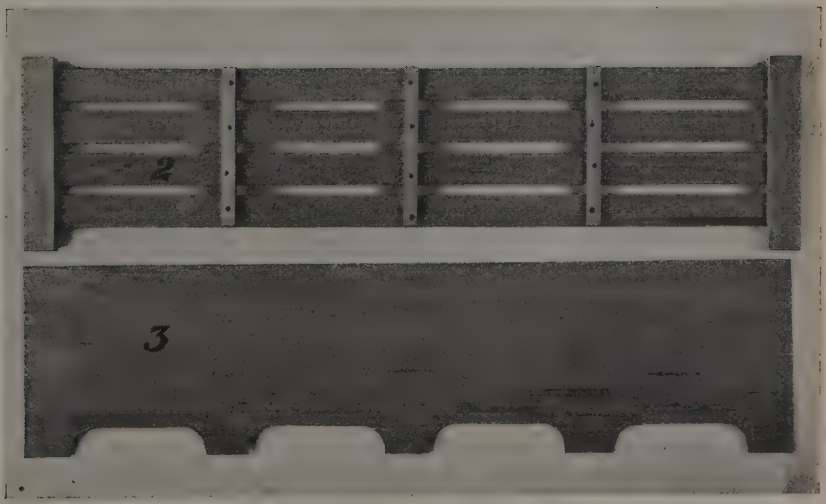


PLATE 142.
Fig. 1. Smoker. Fig. 2. Fence separator. Fig. 3. Slotted separator.

spacing and does not add to the thickness of the comb. Sections may be purchased stamped out in the flat (Plate 143, figs. 2 and 3) ready for folding.

Before folding a section the V cuts are wetted with hot water, which toughens the fibres of the wood and prevents breakage when folding. The next step is to fasten a narrow strip of foundation, called a starter, along the centre of the top and the bottom as a guide to the bees. The lower starter should be not more than $\frac{3}{8}$ of an inch high, for, if too high, it will fall over. This procedure has the advantage of preventing bulging, and it ensures that uniform-sized cells will be formed, the honeycomb consisting exclusively of worker type cells.

When fastening foundation it is convenient to work with a wooden block fitting easily in the inside of the section. The face of the block should come a fraction less than half way through the section, the top of the block standing at an angle of 40 degrees from the operator. The section is placed over the block, and the strip of foundation is then dropped in position. A small quantity of hot beeswax is then poured along the edge of the foundation, thus cementing it firmly to the centre of the section. The section is reversed, and the process is repeated with the second strip.

Separators are made of strips of thin wood, and are used between the rows of sections to compel the bees to build all the combs straight and to maintain or assist in maintaining a bee-space within the sections. When used in conjunction with plain sections they are called fence separators (Plate 142, fig. 2), and they have transverse cleats at regular intervals on both sides, binding the series of slats together, the cleats being so spaced as to be opposite the uprights in the sections. These fence separators allow of free ingress and egress to the sections and overcome to a certain extent the bees' feeling of isolation. On account of the plain, equal sides of the no-bee-way or plain section, it is necessary to have a fence separator on the outside as well as in the inner rows to provide a passage way. Otherwise the sections flush against the sides of the super are closed to the bees. When fence separators are used, super springs are placed behind the outside separator to keep the sections wedged in.

The separators used in conjunction with beeway sections (Plate 142, fig. 3) are much simpler than the fence separator, consisting of a plain piece of slightly scalloped wood, the cut-out portions corresponding with the scallops in the sections. Five of these slotted separators are placed between the rows of sections, none being necessary on the outside. As in the case of the plain sections, springs are used to maintain the sections firmly in position.

The approved method of supporting the sections in the super is to have what are termed section-holders (Plate 143, fig. 6) resting on two tin strips (Plate 143, fig. 1), one at each end of the super. The section-holder resembles a shallow frame without top bar, and is the same width as the sections. Each holds four sections, any one of which can be removed from the top, or each frame of four sections removed from the centre to the outside row, or vice versa.

The social nature of bees makes them averse to working in small detached groups in comb-supers, and they sometimes show a disinclination to accept the prepared sections. To overcome this the brood chamber should be opened, and two or more of the outside combs, which will probably contain honey only, should be removed, and frames of

PLATE 143.

Fig. 1. Tin strip.
Fig. 2. Plain section in the flat.
Fig. 3. Beeway section in the flat.
Fig. 4. Plain section folded.
Fig. 5. Beeway section folded.
Fig. 6. Section holder.

foundation alternated with the brood-combs. There are then no empty cells below to hold honey, for as fast as the new foundation is built out the queen will occupy it with eggs, and consequently the bees are forced to store the honey above. Should a colony swarm in preference to storing honey in the comb-super, it should be hived on frames of foundation and a queen-excluder placed over the brood chamber, the comb super being finally placed on top.

The removal of comb from the hive without damage is attended with more risk than is the case with extracted honey. Smoking the bees is not advisable, for they will immediately puncture the cappings of the comb in their hurry to secure provisions. This damage to the cappings is not only unsightly, but it depreciates the value of the product.

To overcome this a Porter bee-escape (Plate 144, fig. 4) is fitted to a thin board the full size of the hive. On one side of the board slats are nailed to slightly raise the super from the brood chamber. A hole, corresponding to the one on the escape, is then bored through the centre of the board and the escape tacked over it. The bee-escape board should be placed in position without using smoke, and this is best accomplished by first gently lifting the super from the brood chamber from the rear and allowing the super to rest on its front edge. The escape board is then inserted between the two divisions of the hive, the super is lowered on to the board, and the whole is brought into alignment. The bees in the super will pass through the escape to the brood nest below but are unable to return, and if the escape is placed on the hive in the evening the super may be removed, practically free of bees, next morning. When bees leave the super in this gradual way they make no attempt to carry any honey down, and sections are therefore rarely disfigured.

SECTION IV.—COMMENCING BEEKEEPING.

Returns to be Expected.

Although apiculture is extremely fascinating to most people who have a taste for the study of nature, the income to be derived from it is generally the chief factor in leading one to undertake the care of bees. Where large apiaries are planned, they require much hard labour and great watchfulness; the performance of the work at stated times is imperative, and the beekeeper has few opportunities of making a leisurely study of their natural history and habits, his time being almost wholly taken up in attending to the most apparent wants of his charges.

Many people ask for information regarding the profit to be derived from beekeeping, but it is very difficult to answer this question except in a general way. Even the best situations, like all others, are subject to reverses, the result of drought or excessive wet. Under these adverse conditions the beginner must bear in mind that much experience is necessary to enable him to turn to the best account seasons below the average, while during periods of severe drought it will take considerable understanding of the subject, energetic action, and some sacrifice to tide over without disaster. On the whole, there should be expected from beekeeping only fair pay for one's time, good interest on the small capital invested, and a sufficient margin to cover contingencies.

Where to Commence.

Any place where farming or fruit-raising can be successfully followed is suitable for the profitable keeping of bees in a limited way

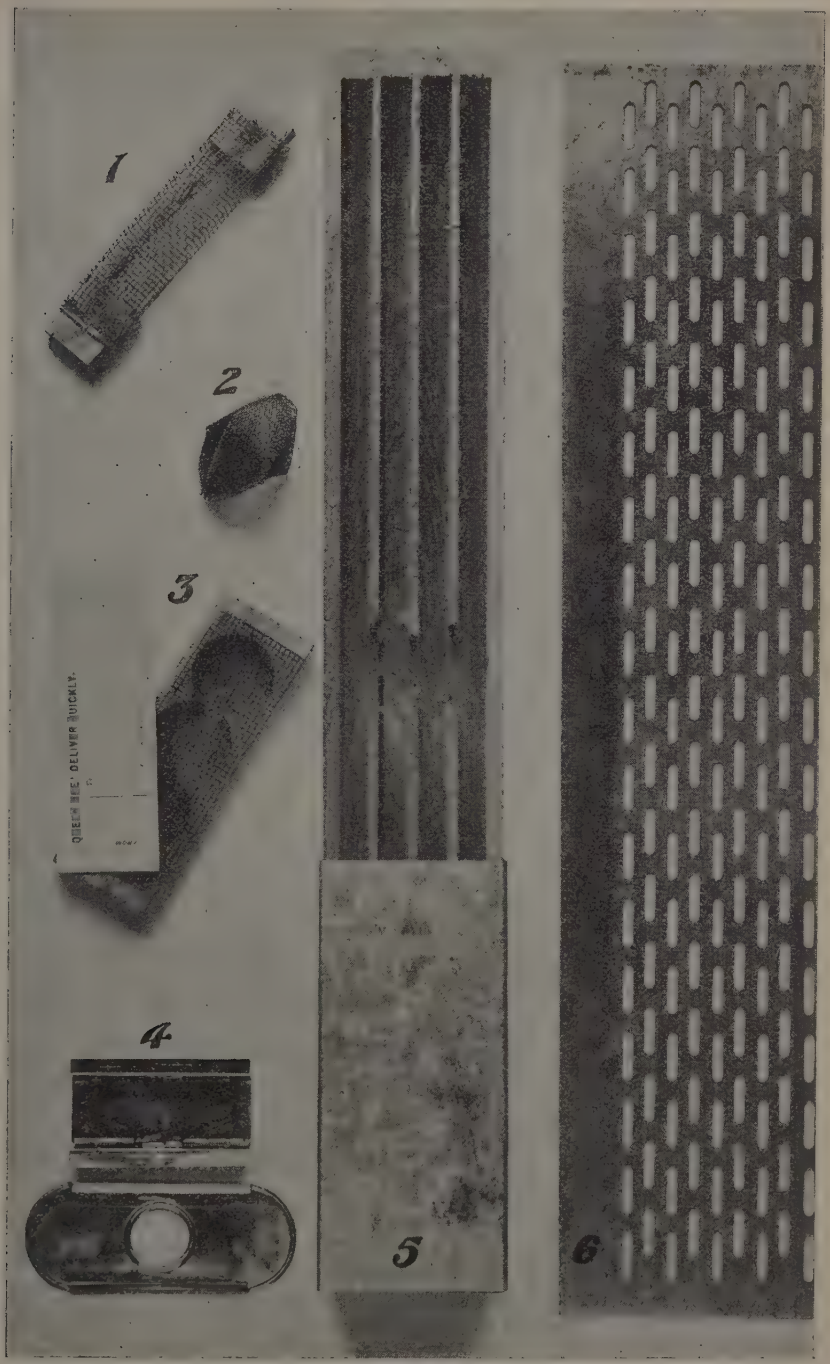


PLATE 144.

Fig. 1. Introducing cage.
Fig. 2. Nursery cage.
Fig. 3. Mailing cage.
Fig. 4. Porter bee escape opened to show inner springs.
Fig. 5. Alexander feeder.
Fig. 6. Queen excluder.

at least. It is evident, therefore, that if the bees are not to be the main source of income, the place where one happens to be situated is quite suitable, as the ability of the bees to draw their sustenance for 2 or 3 miles around must be taken into account in estimating the possibilities of a locality.

On the other hand, when bees are to be kept more extensively as a sole means of livelihood, one must be prepared to go into the bush as soon as the elementary knowledge and some experience in handling bees has been acquired. Queensland possesses a splendid honey-producing flora in her forests, of which enormous areas still remain unoccupied by the beekeeper.

Having decided on the district in which to commence, the prospective apiarist should examine as many places as possible within it, weighing the advantages or otherwise of each site before coming to a final decision. Probably the best sites are those consisting of good mixed eucalyptus forest situated a little inland from the coast. The greater the variety of trees the better, as most eucalypts flower well about one season in three, and only moderately during the other two.

The nectar-producing flora will be found to vary considerably in different districts, according to their soil, rainfall, and elevation. For instance, the Darling Downs, which is rather sparsely timbered, more than balances this deficiency by a rich ground flora, consisting of weeds and low herbage which flower profusely during the spring months.

Later in the season there is usually a good flow from lucerne. This plant secretes very little nectar during the early summer, but after Christmas it continues to yield well until the close of the season. It is probable that the warm and humid atmospheric conditions which generally occur at this period may be more favourable for the secretion of nectar. Apiaries suitably situated in these districts will produce quantities of high-grade honey.

In the coastal belt the conditions are somewhat different. The chief nectar-producing trees are Leptospermum, Melaleuca, and other swamp shrubs in the spring, various mangroves and eucalypts during the summer months, and tea-tree during the autumn. The honey produced is darker in colour, and consequently realises a lower price than the Downs honey. This disadvantage, however, is offset by a more certain crop, due to the greater rainfall, the longer nectar-gathering season, and the much milder winters which are experienced in the coastal districts.

In certain localised areas, such as river flats and creek banks, trees other than eucalypts often occur in sufficient numbers to make a honey flow. These are silky oak, bean-tree, and river myrtle, as well as other representatives of the genus Eugenia, all of which are good honey-producing trees. In other districts where prickly-pear still exists, it is considered to be a most useful plant.

Jungle or rain forest sites are not favoured as honey producers, chiefly owing to the lack of any outstanding nectar-producing tree. Moreover, the moist, shady conditions cause the bees to be backward in building up in the spring, for bees require warmth and sunshine to produce a satisfactory honey crop. When these areas have been cleared, however, and laid down in pasture, white clover is sometimes sown with the grasses. This plant grows vigorously in the virgin soil, whitening the paddocks with its flowers in early summer. Scotch thistles usually

abound in such localities, growing from self-sown seed. If some of the land around is being cultivated with crops of maize, pumpkins, &c., these districts may be classed among the best for keeping bees.

In selecting a bee site, consideration should be given to the following two points:—Firstly, see that there is a permanent water supply within a short distance of the apiary. The quantity of water fifty to one hundred colonies will dispose of would surprise many people. Secondly, if the beginner intends keeping bees on a large scale, he should ascertain that no other bees are being kept within several miles of the selected site, as an otherwise suitable foraging ground may prove to be already occupied by a neighbouring beekeeper.

How to Commence.

A beginning is usually made in one of the following ways, or by all of them combined:—

Full Colonies of Bees.—These may be purchased from established apiaries or bought up here and there until the desired number have been obtained. They should be carefully examined before purchase, as there is some risk of getting neglected colonies containing old or poorly drawn-out combs. When a number of colonies have been acquired in this manner, it is advisable to purchase a full colony from a reputable queen breeder or bee-supply firm. It will be guaranteed high-grade Italian and possess a tested queen. From this colony all the other colonies should later on be requeened, thus improving the strain of the entire apiary.

Swarms.—In the spring arrangements may sometimes be made for the purchase of swarms from beekeepers who do not wish to increase their number of colonies, or the beginner may see a swarm or two himself. Hives with frames of foundation should be bought and prepared beforehand. When a swarm has settled or clustered it should be hived in an ordinary box fitted with a lid, and, as soon as the bees are in, carried to the spot which the frame hive is to occupy. Towards evening, when the bees are not likely to rise in the air again, the frame hive is placed in position, a bag or cloth spread out in front of the hive entrance in such a way as to provide an easy passage-way into the hive, and the swarm shaken or dumped out of the box on to the cloth. If the bees are slow in entering the frame hive, or if a considerable number remain outside, they may be gently driven in by blowing a little smoke on them; none, however, should be blown into the hive.

Nuclei.—Beekeeping may also be commenced in the spring by purchasing nucleus colonies. These consist of small hives holding three frames, and contain a queen accompanied by a few hundred workers, together with some stores. As the season advances, these nuclei will quickly build up, and may then be transferred to full-size hives provided with sheets of foundation.

Wild Bees' Nests from Trees.—When commencing on a new site, the first procedure is to find and remove all bees from bee-trees in the neighbourhood. By doing this the competition from the wild bees is eliminated, and a number of hives may be stocked at very little expense. The easiest way to find them is to make a systematic search of all water-courses and other sources of water, and any bees found obtaining water should be carefully sight-lined and their home found. The tree should be felled and the nest cavity cut open. Sometimes the shock of the fall may so disorganise the colony that it will offer little or no resistance

and may easily be transferred to a frame hive. The following is a good method for transferring the brood comb from box hives, and as a modification of this method, by omitting the drumming process to drive out the bees, is also most suitable for transferring the brood comb from wild bees' nests, it will be described in some detail.

Transferring from Box Hives and Wild Bees' Nests.

Before commencing operations a bucket of water should be close at hand, as the operator should wash the tools and his hands frequently to keep them free from honey. The hive must, of course, be ready and the smoker lighted. A hammer and cold chisel are needed for opening the hive. A ball of thin string, a large knife, and a second hammer or two heavy sticks for drumming on the box hive are also required.

Smoke should be blown into the entrance of the box hive, after which it should be removed and the new hive, preferably with at least one drawn comb in it, placed exactly on the old stand to receive the returning bees. The bottom should be removed from the box hive, which should then be placed on its side close to the new hive. With two sticks or hammers the beekeeper raps on the sides of the box hive with regular and continuous strokes. After a few raps the bees will begin to run towards the open end and enter the new hive. The drumming should be continued for ten or fifteen minutes, until three-fourths of the bees have entered. If the queen is not seen as the bees pass in, the drumming should be continued a little longer.

One side of the box hive is now removed to expose the combs, which are cut out and laid aside until the brood is reached. A large piece of brood comb is laid flat on paper or a board and the frame (unwired) placed loosely on top. The outline of the inside of the frame is marked on the comb with the point of a knife, the frame is set aside, and the comb is cut to fit tightly in the frame. Smaller pieces may be fitted to suit, and the whole tied with a few turns of string. When all the brood comb has been transferred in this manner, the remainder of the frames to fill the hive should be filled with full sheets of foundation.

When transferring the brood comb from trees, as outlined in the preceding paragraphs, as many of the bees as possible should be shaken into the frame hive; then, if the hive is placed on or near the spot where most of the remaining bees are, they may be induced to go in with the help of a little smoke. In the evening the hive should be closed by tacking a strip of wire gauze across the entrance, after which it may be removed to its permanent position. Should the queen have been killed, the bees will make several queen cells, and another queen will hatch out about the sixteenth day.

After transferring is finished, all scraps of comb and wax should be cleaned up to prevent robbing, and, if necessary, some of the honey should be given back to the bees for stores. After a few days the bees will have securely fastened the combs, and the strings may be removed. As the bees become established on the newly-built combs, the frames of transferred comb are gradually worked to the outside of the cluster of bees, then finally withdrawn and melted for wax.

Moving Colonies of Bees.

Bees remember a location so well that some difficulty is encountered by the beginner in moving them to a new stand. They may, however,

be moved to a distance of 1½ mile or more without danger of their returning, because they will have to learn their surroundings before they can venture far from the hive. When it is desired to move them to a fresh spot a short distance from their old position, much more difficulty is encountered. For instance, if the hive should be moved 30 or 40 feet away, the returning field bees will fly straight to the spot previously occupied by their hive and hover there, hopelessly lost. There are two methods of successfully moving colonies a short distance. One is to move the hive a few inches daily, when the bees do not realise that they are being moved; the other method is to shift them several miles away for a week or two, by which time they will have forgotten the old site, after which they may be returned to any desired position in the old yard.

Bees excited by moving or any other disturbance generate a great deal of heat, and if moved during hot weather the hive cover should be removed and a moving screen substituted. This consists of a screen wire top in the place of a regular hive cover. It allows the escape of excess heat that might melt the combs and kill the bees. The temperature may be greatly reduced and the bees quieted if a little water is squirted into the hive through the screen.

Laying out an Apiary.

In order to make the arrangement of the apiary as orderly as possible, it is necessary to mark out the sites that the hives are to occupy before placing them in position. The majority of beekeepers arrange their hives in straight rows. This is an excellent plan, provided they are sufficiently spread out. A minimum distance of at least 8 feet between each hive and 10 feet between each row should be allowed. Where the hives are close and the intervening spaces mathematically alike, more or less straying or drifting of young bees will occur, resulting in some colonies becoming unduly strong while others are depleted of bees. Drifting could also be prevented by putting alternate hives to face different ways and by leaving any shrubs, rocks, stumps, or other distinguishing object, so that their relative positions will give each hive an identity of its own.

Numbering Hives.

It has been found to be a great saving of time if some method of recording the particulars of each colony is adopted. Perhaps the simplest way is to stencil a number on each cover, because, although the bodies may be changed about during various manipulations, the covers always remain on the same spot. If a page in a note-book is allotted a corresponding number, the various records relating to each colony may be easily seen, permitting necessary manipulations to be planned in advance.

[TO BE CONTINUED.]

TO CRANK THE ENGINE.

Bruised and skinned knuckles, caused by the cranking handle slipping while starting the farm engine, may be easily prevented. Cut a circular piece the size of a dinner-plate from a petrol-tin. Punch a hole in the centre and remove a 3-inch segment; make two cuts from the outer edge to the hole. Bring the edges together and fasten with a rivet. You have now a shallow cone; slip this over the handle and there will be no more danger when starting up.

Fertilizing Experiments with Citrus Fruits.

THE Minister for Agriculture, Mr. Frank W. Bulcock, announced recently that, following representations made to him early in 1933, he had given instructions for fertilizer experiment plots to be established on citrus orchards on Tambourine Mountain, with a view to determining whether the cropping capacity of the trees could be increased by the use of artificial fertilizers. Accordingly, the Director of Fruit Culture, Mr. H. Barnes, and Fruit Inspector C. N. Morgan, visited Tambourine Mountain in February of that year, and selected plots of trees for the trials on Mr. H. Curtis's and Mr. W. Green's orchards. The soil on Mr. Curtis's orchard carried a heavy growth of jungle originally, while on Mr. Green's orchard the soil was more of a forest nature. The trees were pruned, and three different fertilizer mixtures were applied to different plots on the two orchards. Later they were given a dressing of hydrated lime. In February of the following year, another dressing, equal to half the previous quantity of fertilizer, was applied. In July of the same year a third application was made, the same quantity being used as with the second dressing.

The results of the first year's trial have shown a very big increase in crop, as the following table shows. It is recognised that 1934 was a good year for citrus fruits; the results, therefore, are not being taken as final, and the experiments are being continued.

It will be noted that No. 3 plot, to which organic fertilizer was applied, has shown the biggest increase in crop—over 200 per cent. It is also evident on inspection that the trees in this particular plot are more vigorous than those of the other two plots, and are of a darker green colour.

One of the main features of the soil in Tambourine orchards is the apparent lack of humus after the natural timber has been cleared for several years, and it would be advisable for growers to plough in green manure crops during the winter months:—

RESULTS OF EXPERIMENTS.

Tree No.	1st Fertilizing, 2/3/33. Applied per tree.	2nd Fertilizing, 13/2/34. Applied per tree.	3rd Fertilizing, 3/7/34. Applied per tree.	Average Crop prior to 1934 in bushels.	Crop 1934 in bush.	1933	1934
1	3 lb. Sulphate of Ammonia.. ..	1½ lb. Sulphate of Ammonia.. ..	1½ lb. Sulphate of Ammonia.. ..	1¾	7		
2				2¾	5		
3	4 lb. Superphosphate	2 lb. Superphosphate	2 lb. Superphosphate	2¾	6		
4				1½	2½		
5	4 lb. Nauru Phosphate	2 lb. Nauru Phosphate	2 lb. Nauru Phosphate	2¾	4		
6				3¾	7		
7	4 lb. Sulphate of Potash	2 lb. Sulphate of Potash	2 lb. Sulphate of Potash	2	5		
8				2	3½		
9				2	4	20¾	44
10	4 lb. Sulphate of Ammonia.. ..	2 lb. Sulphate of Ammonia.. ..	2 lb. Sulphate of Ammonia.. ..	1¾	4		
11				3¾	8		
12	5lb. Superphosphate	2½ lb. Superphosphate	2½ lb. Superphosphate	1½	4		
13				1	3		
14	5 lb. Bonedust ..	2½ lb. Bonedust ..	2½ lb. Bonedust ..	3	9		
15				3	6		
16	2 lb. Sulphate of Potash	1 lb. Sulphate of Potash	1 lb. Sulphate of Potash	3	6		
17				2	5		
18				2½	6	20¾	51
19	4 lb. Dried Blood ..	2 lb. Dried Blood ..	2 lb. Dried Blood ..	3	9		
20				1¼	4		
21	6 lb. Bonedust ..	3 lb. Bonedust ..	3 lb. Bonedust ..	¾	4		
22				2¾	9½		
23				2¾	7		
24	3 lb. Sulphate of Potash	1½ lb. Sulphate of Potash	1½ lb. Sulphate of Potash	3	5½		
25				¾	3¾		
26				1¼	4		
27				1¾	3¾	16¼	50½
				58	145¼	58	154½

Lantana *(Lantana camara)* and Poison Peach *(Trema aspera)*.

THEIR EFFECTS ON STOCK.

By K. S. McINTOSH, B.V.Sc., Veterinary Officer, and C. T. WHITE, Government Botanist.

LANTANAS are common in garden culture in warm temperate countries, and in colder ones are often cultivated in hot houses. Several forms of the common lantana are recognised. Two red flowering varieties have been described—namely, Var. *crocea* and Var. *sanguinea*. These are very close, distinctions given by L. H. Bailey in "The Standard Encyclopædia of Horticulture," being as follows:—

Var. *crocea*—Flowers opening sulphur yellow and changing to saffron.

Var. *sanguinea*—Flowers opening saffron yellow and changing to bright red.

The former, I think, is the common bright flowering lantana naturalised in Queensland, the latter being common in garden culture, and probably run out in one or two localities. The typical form, which is by far the more abundant, has flowers of a much paler hue, opening pale cream with a dark yellow centre, and dying off lilac or purple.

There has been quite a good deal of experimental work carried out with feeding tests on the different varieties. In Southern Queensland and in coastal New South Wales the red flowering forms have been found more toxic, but in experiments carried out at the Animal Health Station, Oonoonbah, near Townsville, the common or purplish flowering variety has been found the more toxic, red flowering forms being more or less innocuous.

LANTANA (LANTANA CAMARA).

Description.

A rambling shrub, stems 4-angled, the angles bearing short, somewhat recurved prickles. Leaves opposite, bright green above, paler beneath, averaging 2½ in. long and 1½ in. wide, but variable as to size, on short stalks about ¼ in., subcordate, rather pointed at the apex, scabrid (rough to the touch) above, the veins and veinlets clothed with white, rather soft hairs beneath, margins serrate-crenate. Flowers in heads of about three flowers, about 1 in. across, on stalks about as long as the leaves, opening pale-cream with a dark-yellow centre, dying off lilac or purplish. Fruit fleshy, purplish-black when ripe, ovoid, about ⅓ in. long, borne on the floral receptacle which becomes elongated, thickened and somewhat fleshy.

Distribution.

A native of tropical America, now widely distributed as a weed over the tropical and sub-tropical portions of the world.

Poisonous Properties.

The poisonous principle of lantana is not known. It is probably an ethereal oil.

PLATE 145.—LANTANA (*Lantana camara*).

Symptoms.

The symptoms of lantana poisoning are weakness, staggery gait, dark stinking manure, owing to the presence of decomposed blood; the animal sometimes begins by scouring, but in most cases becomes very constipated, discharges from eyes and nose, the skin of the nose peels, milk supply diminishes, then ceases, the animal runs a very high temperature, and eventually either dies or makes a slow recovery. Frequently jaundice is also noticed.

Treatment.

Place animal in a cool, shady place with a plentiful supply of water and a quantity of fresh green feed. Plenty of bedding should be given if animal is placed in a shed.

Give frequent enemas with luke-warm soapy water, and administer the following drench:—

Raw Linseed Oil	1 quart
Laudanum	1½ oz.

The above dose is for a mature cow, and may be decreased for younger stock.

POISON PEACH OR WILD PEACH (TREMA ASPERA).

Description.

A shrub or small tree, branchlets clothed with rather soft hairs. Leaves usually 2-3 in. long, and about ¾-1 in. broad, borne on stalks of 3-4 lines, the base more or less rounded, the apex tapering into a rather slender point. Upper surface rough, with short rigid hairs, under surface velvet-hairy, edges serrate. Flowers small, borne in short bunches (cymes) in the axils of the leaves. Fruit black, ovoid or globose, 1-2 lines in diameter.

Distribution.

A very common plant of Northern and Eastern Australia, often comes up very thickly as secondary growth on "scrub" farms.

Poisonous Properties.

Trema aspera, variously known as Wild Peach, Poison Peach, or Peach Leaf Poison Bush, is generally regarded as one of our worst poisonous plants, and there are numerous references to it as a plant poisonous to stock in the writings of Australian botanists. It has been held by some that the harmful effects attributed to the plant were due to its tough and indigestible nature when ingested by stock, in the absence of softer and more palatable food, as the plant belongs to a family, the *Ulmaceæ* or *Elm Family,* the members of which are, as a general rule, quite wholesome. It has been found, however (see Smith and White, in "Proceedings of the Royal Society of Queensland," vol. 32, No. 11) that at times the plant produces a prussic-acid-yielding glucoside, and at such times if eaten in quantity, especially by hungry stock on an empty stomach, might cause death. The presence of this poisonous principle in quantity would, on the whole, fortunately appear to be rare. Its occurrence is very spasmodic, and what controls its formation it is impossible, on our present knowledge, to say. Wild Peach is often eaten by ordinary paddock stock in quantity, without any ill effects following, and in some districts has even been regarded as an important drought fodder.

PLATE 146.—POISON PEACH OR WILD PEACH (*Trema aspera*).

Symptoms.

The symptoms of peach poisoning depend on the quantity eaten. There may be sudden death, but usually general excitement, struggling, followed by depression, shivering, quick breathing, and staggering.

The membranes of the eye and mouth may have a bluish hue due to air hunger.

Treatment.

If peach poisoning is common on the property, it would be economical to keep a few bottles of the following antidote on hand, and administer *as soon as the symptoms are noticed*:—

Bottle No. 1.

Perchloride of iron	3 oz.
Water	8 oz.

Bottle No. 2.

Calcined magnesia	1½ oz.
Water	8 oz.

Add No. 1 to a pint of water, add contents of No. 2 and stir. Administer the whole quantity.

Also inject ½ to 1½ oz. of sulphuric æther under the skin with a hypodermic syringe.

In both of the above cases the animals should immediately be removed from access to the plant. If practicable, eradication of the plant is the best method of preventing the trouble.

Plate 147.—Where the Brumbies come to Water.

Inland Pastures.

PART II.

Response during 1934 Season of Mitchell and Other Grasses in Western and Central Queensland.

Compiled by S. L. EVERIST, Assistant to Botanist, from reports received.

[*A Report submitted to the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, on 14th April, 1934.*]

(*For Foreword and Part I., see March issue.*)

Burke District, "Gulf Fall."

REPORTS were received from Messrs. D. G. Johnston, Land Ranger, Cloncurry; F. R. Dunn, District Stock Inspector, Cloncurry; S. C. Allan, Stock Inspector, Cloncurry; A. S. Moodie, Stock Inspector, Julia Creek; and C. E. Ellis, Stock Inspector, Hughenden. Most reports stated that where sufficient rain had fallen the response of the Mitchell grass had been satisfactory. However, the rainfall was apparently very patchy, consequently the amount of Mitchell grass in the area was below normal, and more general rains would be necessary for complete recovery. Mr. Moodie qualified his remarks by stating that where the country had been overstocked the response was very poor, even where satisfactory falls of rain had been received.

Specimens of all four species of Mitchell grass have been received from the district. Of these, *Astrebla pectinata* and *Astrebla lappacea* are generally regarded as the best, *A. elymoides* and *A. squarrosa* being somewhat inferior to them, but good fodder nevertheless. One report stated that *A. elymoides* was best for sheep, followed in turn by *A. lappacea* and *A. squarrosa*, while for cattle the order was reversed.

Edible herbage does not appear to be very plentiful in the Burke district, grasses being the principal fodder plants.

A report on the Barkly Tableland was received from Mr. F. R. Dunn, District Inspector of Stock, Cloncurry. He stated that the rainfall on the Tableland had been very patchy, but that where the falls had been sufficient the response of the grasses had been satisfactory. A fair amount of edible herbage grows on the Barkly Tableland.

Gregory North (Diamantina, Hamilton, Georgina Fall).

Reports on the district received from Messrs. J. B. Cardno, Inspector of Stock, Winton, and D. G. Johnston, Land Ranger, Cloncurry.—Around Winton itself the response to the early 1934 rains was not very good, although better than anticipated by many people. It was stated by many people that after eleven years' drought the Mitchell grasses would not come back at all, but a fair quantity came up after the rains. During the eleven years of drought sufficient rain fell each year to bring up a small quantity of Mitchell grass, which was promptly eaten off by stock or burned by the sun before seed could be produced, and from this it was argued that the Mitchell grasses would never respond well. Grasshoppers also did some damage to the young Mitchell grass. Curly Mitchell or Downs Mitchell (*A. lappacea*), Bull Mitchell (*A. squarrosa*),

and Weeping or Hoop Mitchell (*A. elymoides*) are all represented and are regarded as good feed, *A. lappacea* being the best and most drought-resistant.

Button grass (*Dactyloctenium radulans*) is also regarded as an excellent fodder which comes up quickly after rain and lasts until the slower-growing species have made some headway. The Winton district is reported as being essentially grass country, herbage being unimportant from the point of view of fodder.

The response in the Boulia district, as reported by Mr. Johnston, was rather patchy. In those areas which received rains in November and December, the Mitchell grass responded well, but in those areas which missed the early rains and received only the February rains, the response was poor. In no part of the area were the Mitchell grasses regarded as being back to normal. On the very open downs between the Hamilton and the Diamantina, the Mitchell grasses did not respond at all.

The growth of herbage in the Boulia district was very good, and on it sheep were principally dependent. Pig-weed (*Portulaca oleracea*) is regarded as the best, while Wild Spinach (*Tetragonia expansa* ?), Tar Vine (*Bœrhaavia diffusa*), Wild Cucumber (*Cucumis* sp.), Potato or Budoo Vine (probably *Ipomœa* sp. ?), and Daisy Burr, Bindy-eye, or Bogan (*Calotis hispidula*) are all good fodders. Sheep keep fat during the winter months by licking up the seeds of the last. Brown Top grass (*Eulalia fulva*) and Flinders grass (*Iseilema* spp.) are also important fodder plants.

Mitchell (Thomson-Barcoo Fall).

Reports have been received from Messrs. C. C. Barth, District Inspector of Stock, Longreach, and T. J. Costello, Land Ranger, Longreach.

Concerning the response of the Mitchell grasses, these are somewhat conflicting. Mr. Barth, on 22nd March, stated that the Mitchell grasses responded very poorly even in places where conditions were favourable, and where it was reasonable to expect good results. Only a percentage of the old roots responded to the good rains, and there appeared to be an absence of young plants, which would suggest that very little seed had germinated.

Mr. Costello on 16th April wrote that Mitchell grasses in the Longreach and Jundah districts responded remarkably well, having regard to the seasonal conditions. Old tussocks believed to be dead showed a wonderful recovery. These and the young grasses received a setback through weather conditions and a plague of grasshoppers.

All the known species of Mitchell grass have been forwarded from this district, together with three Flinders grasses (*Iseilema membranacea, I* sp. nov., and *I. vaginiflora*), Brown Top (*Eulalia fulva*), Button grass (*Dactyloctenium radulans*), and numerous other grasses and herbage plants.

Saltbushes (*Atriplex* spp.), Pigweed (*Portulaca oleracea*), Wild Daisy (*Calotis hispidula ?*), Tar Vine (*Bœrhaavia diffusa*), and Potato Vine (probably *Ipomœa reptans*) are regarded as being the most outstanding herbs in the Longreach and Jundah areas.

Warrego (Bulloo, Paroo, and Warrego Fall).

Reports were received from Messrs. E. J. Tannock, District Inspector of Stock, Charleville, and W. S. Addison, Land Commissioner, Charleville. Both reports state that in general the response of the Mitchell

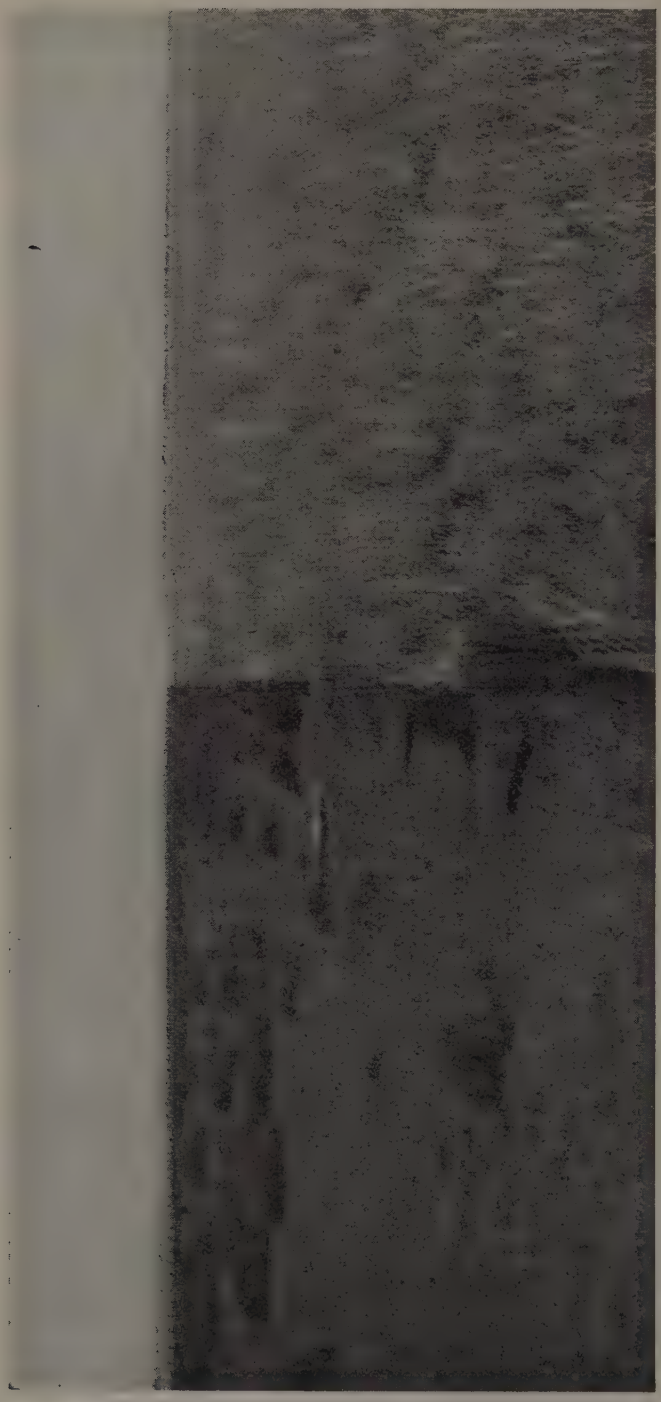


PLATE 148.—OVERSTOCKING THE "LONG PADDOCK."

Showing the effect of very heavy stocking on Mitchell grass, Noondoo Station, near Dirranbandi. Stock route with roley-poley on left; Mitchell grass paddock on right. December, 1934.

grasses to the 1933-34 rains was disappointing. Mr. Addison stated that climatic conditions were not suitable for the production of grass, but were exceptionally favourable for the growth of herbage. The summer was exceptionally cool, and consequently the herbage remained green until the hot weather in March, when it commenced to wither. The herbage growth was phenomenal, and according to old residents of the district, was the best for at least thirty years.

Mr. Addison is of the opinion that Mitchell grasses do not seed every year, but that every second or third year they produce a good crop of seed. His report also stated that where overstocking is practised the Mitchell grasses are definitely diminishing. However, he is of the opinion that if the country is not overstocked and favourable climatic conditions operate, the Mitchell grasses will come again from seed.

Mr. Tannock reported that the response on some pastoral holdings had been fairly good, but that the Mitchell grasses were not present in such quantity as in some former seasons, indicating that there is a diminution of the Mitchell grasses, whilst on many smaller holdings and selections they have practically disappeared, due to the constant heavy and over-stocking, together with a series of dry seasons and droughts. According to Mr. Tannock, horses destroy Mitchell grass pasture by eating the seed heads and pawing up the tussocks, thus preventing the regeneration of the grasses either from seeds or from the old tussocks.

In March, 1934, the Assistant Government Botanist, Mr. W. D. Francis, visited the Charleville area for the purpose of making some observations upon the grasses in the field, and to ascertain the views of pastoralists and others upon the welfare of the principal grasses of the area. In his report upon this visit, Mr. Francis came to the conclusion that in heavily overstocked areas and in those grazed extensively by horses the Mitchell grasses were diminishing. However, he pointed out that this diminution was not general, but that where the Mitchell grasses were not overstocked they seemed to be as good as ever they were. Mr. Francis also made some suggestions for experiments to be carried out for the purpose of ascertaining the effect of keeping stock off a heavily stocked area from which the Mitchell grasses had been eaten out. He further suggested that experimental work should be done on the germination of the seed. Many other matters are discussed in Mr. Francis's report, but it is not proposed to deal with them here.

Regarding Flinders grass, Mr. Tannock and Mr. Addison expressed somewhat different opinions. Mr. Tannock stated that Flinders grass is regarded as a most valuable and nutritious food, and is eaten by all classes of stock in preference to any of the Mitchell grasses. Mr. Addison, on the other hand, said that there is very little Flinders grass in the district, and that it is a very overrated grass, but makes excellent hay and is fattening for stock. In fact, they will lick it up off the ground when it is dry. It has the disadvantage that about 60 points of rain during the winter months will turn it black and destroy it just at a time when the feed is required. Stock will not eat it until it is dry, and they prefer the other grasses. It is a wet-season grass, and flourishes during the seasonable rainy months of January till April; consequently there is generally a heavy crop of Flinders grass during the autumn. If the winter is dry and no rain falls, it provides an excellent crop of natural hay, but since about 60 points of rain at this time will destroy it, it is unreliable.

Mr. Tannock's report also stated that other grasses of outstanding value in the district are Blue grass (*Dichanthium sericeum*) and Brown Top grass (*Eulalia fulva*), which are just as nutritious as Mitchell grass, but not as drought-resistant. Barley grass (*Panicum decompositum* (?)), Button grass (*Dactyloctenium radulans*), Spring grass (*Eriochloa* sp.), Kangaroo grass (*Themeda australis*), Shot grass (*Paspalidium globoideum*), Star grasses (*Chloris* spp.), and White Top (*Pappophorum* sp.) are good fodder, and all are readily eaten by stock, though they are not equal in value to Mitchell, Flinders, and Blue grasses.

The outstanding herbs are Crowsfoot (*Erodium cygnorum* or *Geranium dissectum*), Trefoil (*Medicago* sp. (?)), Lamb's Tongue (*Plantago varia*), Clover and Pigweed (*Portulaca oleracea*).

In addition to the above list, which was forwarded by Mr. Tannock, Mr. Addison mentioned that there is a large amount of annual salt herbage after seasonal rains. This is chiefly confined to the black-soil flats from the Ward River to the Cooper. Stock do not relish this until dry, but apparently lick it up after it dries off. It is a quick grower and heavy producer. Carrots and crowsfoot flourish after favourable winter and spring rains, and during spring and early summer of 1933 the crops of these were phenomenal.

Maranoa.

Reports were received from Messrs. J. G. Cumming, Land Ranger, Roma; W. L. McKee, Land Ranger, St. George; T. W. Gillham, Prickly-pear Ranger, St. George; and A. Shield, Land Ranger, St. George. All reports stated that the Mitchell grass had responded well. Mr. Cumming, however, remarked that this was only the case where it had been allowed to seed biennially. Where the country had been overstocked for a longer period it did not respond so well and was choked out by Blue Bush (*Chenopodium auricomum*).

Only two species of *Astrebla* were forwarded, but all four have been collected from the district this season.

Flinders grass is not common in the area and is of little importance, due to the small quantity available. Mr. Cumming reports on the grass (*I. membranacea*) as follows:—"Responds quickly to rain and reaches maturity with a light rainfall. It is palatable in a green state but is not greatly relished by stock when dry. It is generally one of the last grasses to be eaten by stock and is not as good as it is reputed to be." This is rather surprising, as the general consensus of opinion seems to be that stock prefer Flinders grass when dry.

Other outstanding grasses in the area are Star grasses (*Chloris divaricata, Chloris truncata,* and *Chloris acicularis*), Blue grass (*Dichanthium sericeum*), Brown Top (*Eulalia fulva*), Shot grass (*Paspalidium globoideum*), Kangaroo grass (*Themeda australis*), Couch grass (*Cynodon dactylon*), Button grass (*Dactyloctenium radulans*), Coolah grass (*Eriochloa* sp.), *Bothriochloa intermedia,* and others. Of these the Star grasses (*Chloris* spp.) are particularly important as under heavy stocking they spread and tend to form a sward. The seed head soon blows away but the bottom growth remains. They come away quickly after rain and provide excellent forage for sheep. Many people regard them as the principal grasses of the district. They grow well in all soils except the heaviest black soil and the poor sandy country.

The principal herbs of the district are the various saltbushes (*Atriplex* spp.), Crowsfoot (*Eurodium cygnorum*), Geranium or Parsnip (*Geranium dissectum*), Carrot (*Daucus brachiatus* (?)), Red Burr (*Bassia echinopsila*), Pigweed (*Portulaca oleracea*), Lamb's Tongue (*Plantago varia*), Blue Bush (*Chenopodium auricomum*), Native Lucerne or Emu Grass (*Psoralea tenax*), and Nardoo (*Marsilea Drummondii*). Nut "Grass" (*Cyperus* sp.) is a very important fodder plant in the more southerly portion of the area around St. George and Dirranbandi. It is confined to the low-lying, heavy black-soil flats and is highly thought of by pastoralists. The Red Burr (*Bassia echinopsila*) mentioned above grows chiefly on red soil such as rung Sandalwood or Buddah (*Eremophila Mitchellii*) country. It is a small plant which grows fairly thickly and provides a good bulk of fodder. Sheep seem to be fond of it.

Darling Downs.

Reports received from Messrs. W. Dixon, Inspector of Stock, Goondiwindi; N. E. Kimmorley, Land Ranger, Goondiwindi; S. J. Monaghan, Inspector of Stock, Dalby; and H. McDonald, Inspector of Stock, Jandowae. From the Goondiwindi area Mr. Dixon reports that neither Mitchell nor Flinders grasses responded well. Mr. Kimmorley states that the Mitchell grasses responded very well and there was a splendid crop, though less Flinders grass appeared than during the previous season. This grass is confined to first-class black-soil country along the south-west railway line. Mr. McDonald reports that the only stand of Mitchell grasses in his area is on the Jimbour plain, where they responded very well. He remarks that there are two species of Mitchell grasses and one Flinders grass, though specimens have not yet been sent.

Mr. Monaghan reported that in the area round Dalby there is one kind of Mitchell grass (*Astrebla elymoides*) which is scarce but growing well. There is one kind of Flinders grass (*Iseilema membranacea*). It is also scarce.

From the reports received it appears that Blue grass (*Dichanthium sericeum*) is looked upon as the most valuable grass of the district. In the Goondiwindi area *Thellungia advena* is highly thought of. It is drought-resisting and after dry periods is one of the first grasses to respond to rain. Sheep are very partial to the lower leaves and cattle and horses like the top.

The outstanding herbage plants of the Goondiwindi area are Lamb's Tongue (*Plantago varia*), Wild Carrot (*Daucus brachiatus* (?)), Geranium (*Geranium dissectum*), Crowsfoot (*Erodium cygnorum*), and Trefoil (*Medicago* sp. (?)) as well as various saltbushes (*Atriplex* spp.).

Leichhardt.

Reports received from Messrs. A. Theobald, Land Ranger, Taroom; L. D. Carey, District Inspector of Stock, Emerald; W. J. Sheahan, Inspector of Stock, Clermont; H. R. Drane, Land Commissioner, Clermont; Land Rangers H. R. C. Dowden, G. R. Gray, J. D. Denshire, and F. J. Graham, Clermont; and Land Rangers J. Bergin and J. Leyden, Emerald.

All reports stated that what little Mitchell grass does grow in the district responded very well. Flinders grass also showed a good response. Three true Mitchell grasses—viz., *Astrebla lappacea*, *Astrebla elymoides*, and *Astrebla squarrosa*—were received from this area. In addition to these, specimens were received of two species of *Bothriochloa*.

B. intermedia is sometimes called Tableland Mitchell, and *B.* sp. aff. *intermedia* is sometimes called Forest Mitchell or Desert Mitchell. Both these grasses are regarded as excellent fodders. As they are more closely related to Blue grass it seems inadvisable to use the name Mitchell grass for them.

Iseilema vaginiflora is the only Flinders grass sent in from the district, and Mr. Bergin said that here it is not so palatable as in the western areas.

The principal grass of the Leichhardt district is Blue grass (*Dichanthium sericeum*), and this showed good growth after the 1933 rains.

In the Clermont, Emerald, and Springsure areas a large quantity of herbage grew following the winter rains of 1933. In particular, *Chenopodium auricomum*, known locally as Fat Hen, grew feet high.

Wild Carrots (*Daucus brachiatus*?), Crowfoot (*Erodium cygnorum*), and some saltbushes (*Atriplex* spp.) are fairly common in the area and are eaten by stock. Shot grass or Sago grass (*Paspalidium globoideum*) is reported as being common in some seasons and to be good fodder. Brigalow grass (*Paspalidium* sp.) is said to be an excellent grass in cleared brigalow country which has not been overstocked.

Burnett and Port Curtis.

Reports received from Messrs. E. W. Turner, Land Commissioner, Rockhampton; C. L. D. Hamilton, Land Ranger, Monto; and Land Rangers S. Thomson, P. B. Hamwood, G. Matthews, B. F. Smithers, J. M. Bean, W. G. Wood, and J. Davison, Rockhampton.

All reports stated that there was very little Mitchell and Flinders grass in the district, though the small areas which do carry Mitchell grass showed good growth. The principal grasses of the area are Blue grass (*Dichanthium sericeum*), *Bothriochloa intermedia*, and *Capillipedium parviflorum*. Kangaroo grass (*Themeda australis*) and Bunch Spear grass (*Heteropogon contortus*) are very common and are drought resistant. They are relished in their young stages. Early Spring grass (*Eriochloa* sp.) and various species of *Panicum* and *Chloris* are also looked upon as good grasses.

North Kennedy.

Report received from Mr. F. Tinsley, Land Ranger, Charters Towers.

Mr. Tinsley's report stated that only one pastoral holding in the district carries a large growth of Mitchell grass and that is Natal Downs. The Mitchell and Flinders grasses on the property responded well.

The chief grasses of the district are Spear grass (*Heteropogon contortus*?), Star grass (*Chloris* sp.), Coolah grass, Button grass (*Dactyloctenium radulans*), Kangaroo grass (*Themeda australis*), and Umbrella grass (probably *Chloris* sp.). Mr. Tinsley reported that there are no outstanding herbs in the district.

NOTES ON SOME INDIVIDUAL SPECIES.

Mitchell Grasses (Astrebla spp.).

Astrebla lappacea.—Usually known as Curly Mitchell grass. In some places called also Wheat-eared Mitchell, in others Downs Mitchell. Both these names have also been applied to *Astrebla pectinata* q.v.

Habitat.—*Astrebla lappacea* in general favours heavy black-soil flats and open downs, though in the Charleville district it is reported to be growing profusely on tight brown soil ridges.

Distribution.—Curly Mitchell grass is widespread over the western areas of the State, and in Central Queensland extends as far east as the Dawson River and Mackenzie River. Here, however, and in the Leichhardt district generally it is not very plentiful, Blue grass (*Dichanthium sericeum*) being the principal pasture grass. In the more southerly portions of the State, such as around Dirranbandi, *Astrebla lappacea* and *Astrebla pectinata* occur in approximately equal amounts, but further north *A. lappacea* becomes dominant. Strangely enough, however, in the north-western portion of Queensland, round Cloncurry, Burketown, &c., *Astrebla pectinata* apparently becomes dominant. This assumption is based upon the fact that comparatively few specimens of *A. lappacea* have been received from the area, while quite a number of specimens of *A. pectinata* have been sent in from time to time. It remains to be seen whether careful observation by a botanist will substantiate this conclusion.

Fodder Value, &c.—In most places *A. lappacea* is regarded as being the best species of Mitchell grass from the point of view of drought resistance, palatability, and nutritive value. Some observers, however, rank it as second to *A. pectinata* in this respect, others as equal to *A. pectinata* and one at least as inferior to *A. elymoides*, the Hoop Mitchell, for sheep and as inferior to *A. squarrosa*, the Bull Mitchell, for cattle. Some reports state that stock prefer it in the dry state, others that they relish it in all stages of growth.

Astrebla pectinata.—Usually known as Barley Mitchell grass or Common Mitchell grass, also in some districts as Wheat-eared Mitchell grass. In the Burke district habitat forms receive distinct common names, such as Downs Mitchell, Gulf Mitchell, &c.

Habitat.—*Astrebla pectinata* grows in somewhat the same situations as *A. lappacea*, though in the Charleville area it is reported as being more partial to loose cracky country. It is common on heavy black-soil flats and open downs. Sometimes it occurs in low-lying country associated with Bull Mitchell (*A. squarrosa*).

Distribution.—The distribution of *A. pectinata* in Queensland is somewhat strange. It is very common in the south-west, but further north appears to become less dominant. However, reports from the far north-west indicate that in that district it once more becomes the commonest species of Mitchell grass. (*See also* notes under *A. lappacea.*) *Astrebla pectinata* apparently does not extend so far east as *A. lappacea* and *A. elymoides.*

Fodder Value.—In most places *A. pectinata* is regarded as equal or but slightly inferior to Curly Mitchell (*A. lappacea*), though some reports state that it is superior in palatability and nutritive value to Curly Mitchell.

Astrebla elymoides.—Usually known as Hoop Mitchell or Weeping Mitchell, sometimes also called Curly Mitchell, though this name is more frequently applied to *A. lappacea.*

Habitat.—*Astrebla elymoides* is almost invariably associated with *A. lappacea* and *A. pectinata*, favouring the same heavy black and brown alluvial soils.

Distribution.—Hoop Mitchell is apparently the most widely distributed of the Mitchell grasses. In Queensland it occurs from the southern border to the Gulf country and from the Barkly Tableland to the Upper Dawson and Mackenzie Rivers.

Fodder Value, &c.—The general consensus of opinion appears to be that *A. elymoides* is inferior to both *A. lappacea* and *A. pectinata* in palatability and nutritive value. Nevertheless it is regarded as a valuable fodder in times of scarcity as stock eat it readily enough when the best has been eaten out of other grasses. Some observers rank *A. elymoides* above all the other Mitchell grasses. One at least stated that for sheep it was superior to *A. lappacea,* but that for cattle it was inferior to that species.

Astrebla squarrosa.—Almost universally known as Bull Mitchell. Sometimes the name Wheat-eared Mitchell is applied to this species.

Habitat.—*A. squarrosa* is usually found on low-lying, heavy black-soil flats, along watercourses, &c. It is sometimes found on the open downs, but generally favours damper situations.

Distribution.—The distribution of *A. squarrosa* is much the same as that of *A. lappacea* and *A. elymoides.* Where *A. pectinata* occurs *A. squarrosa* is frequently found growing with it, though in the more low-lying areas *A. pectinata* tends to disappear.

Fodder Value, &c.—Opinions differ as to the fodder value of *A. squarrosa.* Most reports state that stock will eat it when driven on to it by shortage of other feed, though one observer remarked that for cattle it was superior to *A. lappacea* and *A. elymoides.* As to what portion of the plant stock will eat, varied reports have been received. Some reports stated that when hungry stock will eat both the leaves and the seed-heads, others that they will eat the seed-heads only, while one at least stated that sheep will eat the flag only. The seed-heads are very heavy and the grain is large, so that there should be quite a fair amount of nutriment in them.

Flinders Grasses (Iseilema spp.).

There are four species of Flinders grasses recorded. Of these, three are found fairly frequently, the other, *Iseilema macrathera,* is very rare.

The other three species are usually not distinguished by pastoralists and consequently no distinctive common names are given to them, all being known as Flinders grass. However, for the purpose of easy reference, it has been thought advisable to give them vernacular names.

Iseilema membranacea (previously known as *I. actinostachys*), Small Flinders grass; a small species, usually straw-coloured when dry and with the spikelets or "seeds" very prominent.

Habitat.—*I. membranacea* grows on the heavy black-soil flats and open downs which carry Mitchell grasses. It is frequently associated with the Mitchell grasses though it sometimes forms almost pure stands.

Distribution.—*Iseilema membranacea* appears to be the most widely distributed of the Flinders grasses. In Queensland it has been found from the Darling Downs to the far north-west. In the more southerly localities, however, it is not nearly so plentiful as in tropical regions, and on the Darling Downs may have been introduced by sheep. However, no specimens have been received from the Leichhardt district in

Central Queensland, though *I. vaginiflora* is apparently fairly common there.

Fodder Value, &c.—All the Flinders grasses appear to be similar in fodder value. They are annual grasses which spring up quickly after rain, run to seed almost immediately, and then die off. Their principal value lies in the fact that stock are, as a rule, very fond of the dry plants which are quite nutritious. Even when the seeds have fallen and the plants have disappeared, stock will lick up the fallen seeds from the dust. A report upon *I. membranacea* from the Roma district, however, states that it is only eaten in a green state and is not relished by stock.

Iseilema vaginiflora, Red Flinders Grass.—A somewhat larger and more leafy species than *I. membranacea*. It usually turns red at maturity.

Habitat.—In addition to the heavy black-soil flats this grass has been reported as growing on stony ridges.

Distribution.—*I. vaginiflora* does not extend so far south as *I. membranacea* but seems to be the commonest species in Central and North-Western Queensland. In Central Queensland it extends as far east as the Mackenzie River and is the only species recorded from the Leichhardt district. It is also recorded from the Northern Territory.

Fodder Value, &c.—*See* under *I. membranacea*. In the Leichhardt district this grass seems to lose its palatability, and stock do not generally relish it. It has been stated that this is due to the heavier rainfall experienced in these districts.

Iseilema sp. nov. (previously known as *I. membranacea*).—A comparatively rare species for which no distinguishing vernacular name is known. It is very much like Red Flinders grass (*I. vaginiflora*) and is difficult to distinguish from that species.

Habitat.—We have few notes on the habitat of this species but it seems to favour rather damp situations such as low-lying flats, edges of watercourses, &c.

Distribution.—So far as we know this species is confined to the tropical regions of Western Queensland, though it may extend into the Northern Territory. It apparently occurs to a limited extent in the Mitchell, Gregory North, and Burke districts.

Fodder Value, &c.—Like the other species, this is regarded as an excellent fodder grass, particularly when drying off.

Blue Grasses (Dichanthium spp.).

The species of *Dichanthium* are under review by Mr. C. E. Hubbard, of the Royal Botanic Gardens, Kew, England, consequently it is not proposed to deal with each species separately.

Blue grass is the name used throughout Queensland for *Dichanthium sericeum* and its allies, though they are also sometimes called Queensland Blue grass.

Habitat.—Blue grasses occur in a variety of situations, though usually upon good soil. They are common on alluvial flats and on downs country.

Distribution.—The Blue grasses extend from the coastal districts to the Mitchell district. In the Leichhardt district they are the chief

grasses, and in the northern portions of the Maranoa and Warrego districts are ranked very high. On parts of the Darling Downs Blue grasses are also fairly common. Blue grasses are found along the coastal strip, though they are not very important pasture grasses except in the Rockhampton-Monto area.

Fodder Value, &c.—All reports stated that the true Blue grasses are palatable and nutritious, though not very drought-resistant. In the Leichhardt district, Blue grasses are the dominant species and are eaten in preference to anything else.

Many reports stated that Blue grasses tend to disappear under heavy stocking in much the same way as Kangaroo grass (*Themeda australis*). This disappearance under stocking may account for the restricted range of the Blue grasses.

Some Allies of the Blue Grasses.

Bothriochloa intermedia (*Amphilophis intermedia*), Forest Blue Grass.—A number of local names have been applied to this grass including Rare Blue grass, Large Blue grass, Dawson Blue grass, Tableland Mitchell, and Forest Mitchell. None of these are particularly appropriate so it has been decided to call it Forest Blue grass.

Habitat.—*Bothriochloa intermedia* usually favours good soil, though it occurs on sandy country and gravelly ridges. It is commonly found on open forest country and on open downs as well as alluvial flats. In the Moreton district it is frequently found along railway embankments, cultivation headlands, &c.

Distribution.—*Bothriochloa intermedia* is common in the coastal districts of Queensland and has been recorded from as far north as Mount Molloy. It extends as far west as parts of the Maranoa district and is also abundant in the Leichhardt district, round Clermont, Emerald, and Springsure.

Fodder Value, &c.—Reports received state that this grass is much relished by stock and is very nutritious. It is also fairly drought-resistant when once established and seems altogether a desirable grass. *Bothriochloa intermedia* and *Capillipedium parviflorum* are reported as being the principal grasses of the Rockhampton, Monto, and Gladstone districts.

Bothriochloa sp. aff. *B. intermedia*, Desert Blue Grass.—This species, which has not yet received a distinctive botanical name, is called Desert Mitchell in many places and Forest Mitchell in others. However, it seems advisable to restrict the name Mitchell grass to members of the genus Astrebla, so it is proposed to call this species Desert Blue grass.

Habitat.—In the Leichhardt district this grass is reported as growing upon all classes of country from good black soil to desert. Further west it favours the desert country.

Distribution.—Desert Blue grass has a rather restricted distribution in Queensland. It is found in Central Queensland, round Emerald and Clermont. Further west it has been recorded from Lochnagar, near Barcaldine, and from Longreach. In the Burke district specimens have been collected near Cloncurry, though it is not known in what type of country it was growing.

Fodder Value, &c.—In the Clermont district, where it is usually called Forest Mitchell, this is regarded as one of the best grasses. It is

very drought-resistant and is one of the first grasses to show up green after rain. Reports state that it is fairly nutritious and that stock relish it. After hardening up on it they work nearly as well as on artificial feed. It is reported, too, that frost causes it to become sour.

Eulalia fulva, Brown Top, also sometimes known as Sugar grass, and Red or Bastard Mitchell. It is allied to Blue grass but the seed-heads are dark-brown in colour.

Habitat.—*Eulalia fulva* favours low-lying country such as gilgai holes and Coolibah flats. It is generally found on good soils.

Distribution.—Brown Top is very widely distributed in Queensland, and specimens have been received from all parts of the State except the south-eastern corner and the Cape York Peninsula.

Fodder Value, &c.—Most reports state that *Eulalia fulva* is quite a useful grass. It is drought-resistant, palatable, and nutritious but, like most of its allies, is susceptible to frost.

Capillipedium parviflorum, Scented Golden Beard; also known as Golden Scented Beardy and Scented Top.

Habitat.—Found commonly in forest land and on alluvial land. It is also very abundant on railway embankments, cultivation headlands, and in other places where the ground has been disturbed.

Distribution.—*Capillipedium parviflorum* is seen at its best in coastal districts, and is common all along the coastal strip of Queensland. In the Port Curtis district it is particularly abundant.

Fodder Value, &c.—Glowing reports upon this grass have been received from the Rockhampton district, where it is regarded as one of the best of the native grasses. In other districts it does not seem to have attracted particular attention.

Miscellaneous Grasses.

Heteropogon contortus, Bunch Spear grass; also known as Black Spear grass and Spear grass.—When mature the seed heads twist together into bunches, giving the plant quite a characteristic appearance.

Habitat.—*Heteropogon contortus* is common in forest land, though it does encroach upon black-soil flats. It is frequently found on old cultivation paddocks.

Distribution.—Bunch Spear grass is widely distributed over Eastern Queensland. It is not found in the western districts.

Fodder Value, &c.—When young, *Heteropogon contortus* makes excellent feed, but after the seed-heads appear it becomes somewhat dangerous. The "seeds" are very sharp and are capable of penetrating the skin of animals. This grass also makes very good "chop-chop" and could be used successfully as a hay crop.

Chloris spp., Star grasses, Windmill grasses, or Blow-away grasses. —There are a number of species of Chloris native to Queensland, the four most important from a pastoral point of view being *Chloris divaricata, Chloris truncata, Chloris ventricosa,* and *Chloris acicularis.* No specific common names are applied to these.

Habitat.—Chloris grasses are found in almost all types of soils and in a variety of situations.

Distribution.—Star grasses are widely distributed in Queensland from the interior to the coast. They are of particular importance in the Maranoa district, where they are regarded as some of the best grasses available.

Fodder Value, &c.—The Chloris grasses are palatable and nutritious, and are relished by stock. They run to seed very quickly, but form good bottom growth, which is extensively eaten by sheep. Under heavy stocking, *C. divaricata* and *C. truncata* do not disappear, but tend to spread and form a sward. For this reason they are particularly valuable. Their only disadvantage is that they do not provide a very great bulk of feed.

Paspalidium spp.—This genus contains the Brigalow grasses, Warrego grass, Shot grass or Sago grass, as well as numerous others which have not received vernacular names. The species are not at present well understood, so it is proposed to treat them all in one group, with the exception of Shot grass, which is a distinct and rather important species.

Paspalidium globoideum.—Shot grass or Sago grass, sometimes called Quail grass.

Habitat.—Shot grass rather favours damp situations, such as the edges of bore drains, though it is common on open downs and in box and belah country.

Distribution.—Found chiefly in the Leichhardt district, Northern Darling Downs, and Northern Maranoa. It is less common in the Warrego district.

Fodder Value, &c.—*Paspalidium globoideum* is highly spoken of as a fodder, and is reported as being fairly drought-resistant.

Other Paspalidium Grasses.—These are fairly widely distributed in Queensland and occur in a variety of situations. Most of them are highly spoken of as fodders, particularly those species which are found in Brigalow country.

Eriochloa spp.—The species of Eriochloa are also not well understood at present, so it is proposed to treat them under one heading. They are usually known as Early Spring grasses or Dairy grasses, but neither of these names seem to be particularly appropriate. In the Southern Maranoa they are called Coolah grasses, but in New South Wales this name is applied to *Panicum prolutum*. The genus *Eriochloa* is fairly widely distributed in Queensland, and most of the species have excellent reputations for palatability and nutritive value. Some of them resist drought and stocking well, and when once established should be quite valuable pasture plants.

Dactyloctenium radulans, Button grass.

Habitat.—Common on the better classes of soil, such as black-soil plains and open downs.

Distribution.—Button grass has a wide distribution in Western Queensland, and extends from New South Wales to the Gulf.

Fodder Value, &c.—Button grass is regarded as an excellent fodder. It responds very rapidly to light rains, and affords a certain amount of forage for stock until it dries off. When it dries off the seed heads are eaten. It is an annual grass.

Themeda australis, Kangaroo grass.

Habitat.—Kangaroo grass grows upon almost all classes of soil and in a variety of situations. It is especially common in railway enclosures.

Distribution.—Kangaroo grass is very widely distributed in Queensland, though it has disappeared under stocking in many localities.

Fodder Value, &c.—When young, Kangaroo grass seems to be quite good fodder, but it becomes harsh and unpalatable when mature. In some localities it is regarded as a wormy grass. Under stocking Kangaroo grass disappears very quickly.

Brachyachne convergens, Star grass, also sometimes called Wiry Star grass.

Habitat.—Common on black-soil plains, in depressions, along creek banks, and on river flats.

Distribution.—*Brachyachne convergens* is common in the Leichhardt district and along the Great Northern Railway. It is also abundant in the Gulf country.

Fodder Value, &c.—Though Star grass is very abundant, it does not seem to be eaten by stock to any great extent. From Hughenden it has been reported that stock will not eat it when green, but are fond of it when drying off. Reports from Cloncurry stated that it is a very valuable fodder grass, and is one of the best grasses on the Lower Cloncurry and Leichhardt Rivers.

There are many more grasses of minor importance, but these are too numerous to be dealt with here.

Herbage.

Herbage plants, particularly Saltbushes, are very important fodder plants in the pastoral areas of Queensland, and during 1933 the growth of herbage in some parts of the State was phenomenal. This was due to the winter rains, which, it is reported, always bring up large crops of annual herbage plants.

The most important herbage plants are the Saltbushes (*Atriplex* spp.) and their allies. A number of these are perennials, and provide feed all the year round, even when the grasses have disappeared. They are very drought-resistant. Some of the species are annuals.

Red Burr (*Bassia echinopsila*), a plant of the Saltbush family and closely allied to Galvanised Burr (*Bassia Birchii*), is common in parts of the Maranoa district, and is regarded as an excellent fodder. Some of the Roley-poleys (*Salsola Kali* and various species of *Bassia*) are also looked upon as good forage plants. Blue Bush (*Chenopodium auricomum*) and other species of *Chenopodium* and *Rhagodia* are generally regarded as quite good fodders.

Apart from the Saltbushes and their allies, the most important herbage plants seem to be Pigweed (*Portulaca oleracea*), Crowsfoot (*Erodium cygnorum*), Geranium or Wild Parsnip (*Geranium dissectum*), Wild Spinach (*Tetragonia expansa* or *Trianthema decandra*), Emu grass or Wild Lucerne (*Psoralea tenax*), various clovers and Medics (*Medicago* spp.), and Lamb's Tongue (*Plantago varia*). Nut grass (*Cyperus* sp.) is also highly spoken of in parts of Southern Queensland, and Nardoo (*Marsilea Drummondii*) is looked upon favourably in some quarters.

The list of herbage plants could be considerably extended, but those quoted above seem to be the most important.

By JAS. CAREW, Senior Instructor in Sheep and Wool.

THE fat lamb raising scheme, inaugurated by the Minister for Agriculture and Stock a little over twelve months ago, has proved most interesting and satisfactory. The object of the scheme is to foster this important branch of the pastoral industry, and this is done through the co-operation of the Department of Agriculture and Stock with the sheep farmers with whom rams were placed by the department.

The season over the Darling Downs, where eighty rams were allotted to thirty different farmers, has been fair to good, with the exception of a dry period during spring and early summer. The farmers selected had previously been running sheep in conjunction with agriculture, many of which had rams of British breeds other than those allotted by the department, and these were included in the experiment for purposes of comparison.

The first mating proved very satisfactory, and resulted in 2,110 lambs being marketed at Cannon Hill fat stock saleyards under the usual selling conditions.

A Classing Difficulty.

Selecting the lambs from the respective breeds and classing them correctly in separate pens is one of the difficulties met with. This, in most cases, is due to the fact that the numbers were not sufficiently large to separate according to breed or cross, and then class to size and quality. Lambs classed for breed and later for type, condition, and size in all cases sold more satisfactorily than the crosses from different breeds which had been mixed and penned together.

During the early stages of these experiments, many lambs were forwarded which showed unevenness in age, size, and condition; but as the experiments progressed, a distinct improvement in selection was shown, and most of the lambs were put on the market in even lines, showing good to prime condition before reaching the age of five months.

Weighing Test.

As the weights of lambs could not be conveniently secured from the purchasers, only one weighing test was conducted during the season.

This test was organised in co-operation with the owner, Mr. S. G. Cooper, Warrabah, Karara, and his selling agent, Dalgety and Company, Brisbane. The lambs were bred, fattened, and forwarded to the Cannon Hill saleyards by the owner, Mr. Cooper. The reason for carrying out the test was to secure data in checking up on the wastage of lambs from the time they leave the pasture to the time they are auctioned at market.

Plate 149.
Pen of lambs of Southdown-Corriedale Cross, bred at Warrabah, Karara, Darling Downs, Queensland.

Three lambs, 4½ months old, were selected for the purpose and weighed on the holding on Saturday morning, 15th December, and again at Cannon Hill on Monday morning, 17th December, just prior to being auctioned, with the following results:—

Lamb No. 1, Romney Marsh-Corriedale cross, branded red C2C on back—

Net live weight on holding	69 lb.
Net live weight at saleyards	64 lb.
Net loss in live weight	5 lb.

PLATE 150.

Southdown-Merino lambs bred in the Clifton District, Darling Downs.

PLATE 151.

Southdown-Corriedale lambs at 4½ months bred by S. G. Cooper, Warrabah, Karara.

Lamb No. 2, Southdown-Corriedale cross, branded red CC—

Net live weight on holding	71 lb.
Net live weight at saleyards	66 lb.
Net loss in live weight	5 lb.

Lamb No. 3, Southdown-Corriedale cross, branded C—

Net live weight on holding	73 lb.
Net live weight at saleyards	67 lb.
Net loss in live weight	6 lb.

This lamb was again weighed at 6 p.m., just prior to slaughter. Following are the results:—

Net live weight	66 lb.
Weight of offal and blood	17 lb.
Weight of skin, head, and feet	12 lb.
Weight of dressed carcass	37 lb.

Five breeds of rams were purchased and distributed, and the results of sales from the progeny of these and other rams included for comparative purposes are as follows:—

Number of Sales.	Number of Lambs.	Total Value.	Highest Price.	Lowest Price.	Average.
		£ s. d.	s. d.	s. d.	s. d.
		Border Leicester Cross.			
15	965	889 10 6	24 0	12 3	18 5
		Southdown Cross.			
15	474	424 12 0	24 0	11 0	17 11
		Dorset Horn Cross.			
12	440	376 4 9	21 0	13 0	17 1
		Romney Marsh Cross.			
2	18	14 14 3	17 3	14 0	16 4
		Lincoln Cross.			
6	182	134 17 9	17 6	12 0	14 9
		Shropshire Cross.			
1	31	29 9 0	19 0	..	19 0

Total, 2,110 realised £1,869 8s. 3d.
Average all lambs, 17s. 8d. per head.

The Shropshires were in only one sale, and should, therefore, not be noted for purposes of comparison.

Sheep Licks.

By J. L. HODGE, Instructor in Sheep and Wool.*

IT is a fact to be very much regretted that the sheep pastures of Queensland have, in the last twenty-five years, become depleted owing to the eating out of many of the indigenous grasses. Overstocking and drought conditions are to a large extent accountable. Add to this the fact that most Australian pastures are, under natural conditions, deficient in phosphates, and the question arises, apart from the restoration of grasses, what can be done to help the stock in these circumstances? The answer is to be found in the supply to sheep of prescribed licks. The use of ingredients composing a lick should be determined by the lack of essential minerals in the feed and water, as found by analysis. For this reason it will readily be seen that even a good lick as far as its contents are concerned may be misapplied where the proved deficiencies in one district are found to be different from those of another.

Under ordinary average conditions the use of a lick should not be necessary for more than six months of the year, although some graziers contend that it pays to give the sheep access to the materials all the year round. Most benefit is to be derived from the use of a lick during the periods of hard winter feeding or when the sheep are on scrub.

Sheep should not be allowed to become poor in condition before supplying the lick; the period, therefore, when a lick is most profitable will be indicated more by the feed and weather conditions than by the condition of the flock.

Essentials of a Good Lick.

The chief essential is phosphoric acid (P_2O_5), and this may be supplied by the use of Nauru phosphate finely ground, sterilized bone meal, or "Calphos," an excellent product put up by the Queensland Meat Board. This material has everything to recommend it. It is rich in phosphoric acid and is carefully ground. It also contains a protein. In the past we have been sceptical when recommending sterilized bone meal because of the fact that the price was sometimes prohibitive and the supply was not sure. In the case of "Calphos" I am assured that supplies are quite sufficient to meet the demand, and at the price quoted —£9 per ton—the material is to be recommended. Di-calcic phosphate has lately come into prominence as an ingredient in a sheep lick. It is certainly more easily assimilated than Nauru phosphate, but the price is very high in comparison. Judged from all points of view I prefer "Calphos" or sterilized bone meal, both of which contain a protein in addition to the phosphoric acid. We have had marked success during the past few years through adding a protein to the lick, especially one prescribed for use during periods of drought, when a lick may be relied upon to be of most benefit. Linseed meal, cotton seed meal, peanut meal or wheat meal may also be used. On the whole I prefer the linseed meal.

The question of the quantity of salt to be added to a lick depends entirely upon the quantity to which sheep have access from other sources. If the water, for instance, is saline, the quantity of salt used would depend on the quantity of salt in the water. The more salt found the

* In a broadcast address, arranged with the Australian Broadcasting Commission, from Radio Stations 4QG, Brisbane, and 4RK, Rockhampton.

less would be prescribed in the lick. In some cases it would be wrong to use any salt at all.

A small quantity of sulphate of iron may be used with advantage in all cases. Its action is tonic. Epsom salts are invaluable when used in proper quantities, and these may be greatly varied to suit circumstances. Generally speaking, the harder the feed the greater the quantity of Epsom salts. Molasses may be used in sufficient quantities to bind a lick. Although its feeding value is extremely low it has other advantages which recommend it. Apart from binding a mixture it is appetising and laxative.

When recommending the addition of a protein to a lick containing salt I always sound a note of warning with regard to ewes halfway through the period of gestation. The danger is that the protein may tempt the ewe to take too much salt, with the result that twin sickness or lambing disease may occur. In these circumstances, therefore, it is advisable to take out a great proportion of the salt recommended under ordinary conditions. This applies to the ewes as described. The dry portion of the flock may have the ingredients as mentioned hereunder at any time.

In the past it has been considered necessary to use a certain proportion of iodine in the form of potassium iodide in a lick. It is now thought that this may be done away with in Queensland, as its usefulness has not been proved, and the material is highly expensive.

Variation in Lick Quantities.

The quantity of lick necessary to sheep varies. Old ewes with lambs at foot require more than dry sheep. Likewise, young growing sheep of either sex should have more than mature sheep. On an average sheep should consume lick at the rate of 2 oz. per head per week. At £9 per ton the approximate cost of the lick recommended herein works out roughly at 1d. per head per month.

Feeding a Lick.

The practice of feeding a lick to sheep in open troughs is not to be encouraged. It is wasteful. Besides the risk of loss by rain the flocks foul the mixture, making it eventually unfit for consumption.

A lick feeder is recommended by the Department. It consists of a "V"-shaped trough with a hinged and covered top. There is an aperture at the bottom of the trough which automatically releases the lick. A lick board sufficiently broad for the purpose is attached to the stand about an inch and a half below the opening and at a serviceable height from the ground. A beaded edge is supplied to save unnecessary waste.

Registration of Licks Compulsory.

Legislation these days makes it compulsory for proprietary vendors to register licks with the Department of Agriculture and Stock and to attach a label to each package setting out the contents. Graziers should be careful to see that this is done. There are many good proprietary licks on the market, but care in the choice of one should be exercised before purchasing, as it does not follow that the same pastoral deficiencies would be found in different districts.

During bountiful seasons the need for a lick decreases. This is accounted for by the fact that the pastures themselves supply the sheep

grazed on them with the necessary minerals and proteins which latter are especially plentiful with young feed.

Mineral deficiencies are especially noticeable in natural pasture grasses during the winter months, hence the recommendation for the use of the lick during this period.

It was fairly generally accepted as a fact some years ago that in the matter of salt sheep themselves were the best judges of how much to take. Those days are past, and we know now that there is a grave danger in the feeding of too much of this ingredient. For general purposes I recommend a lick composed of the following ingredients:—

"Calphos," sterilized bone meal, or Nauru phosphate	40 parts
Salt, butchers' quality	40 „
Sulphate of iron	4 „
Epsom salts	4 „
Linseed meal, cotton seed meal, maize meal, wheat meal	12 „

The whole to be bound with sufficient molasses for the purpose.

The whole or any of these ingredients may be altered to fit certain circumstances, and with that object in view it is necessary that the grazier should learn the properties of the materials used.

Calphos, sterilised bone meal, and Nauru phosphate all contain that important ingredient, phosphoric acid (P_2O_5), an absolute necessity to the health of all paddock-fed sheep. "Calphos" and sterilized bone meal contain, in addition, a protein which is lacking in Nauru phosphate. It is for that reason that I recommend their use.

Salt is in most cases included in the lick, but, as previously indicated, its use should be greatly restricted where the water is saline or in the case of ewes in lamb.

Sulphate of iron is a tonic, and its use may be freely availed of in small quantities as prescribed in all licks.

Epsom salts are used as a laxative, and here again the quantity may be largely altered, if necessary, to comply with special circumstances. It takes much more Epsom salts than is generally recognised to purge a sheep, and the quantity given in the lick herein may safely be doubled should the necessity arise without doing the sheep any harm.

I advise graziers to have on hand a supply of the ingredients mentioned with the object of mixing the lick on the property. If it is preferred to have the lick ready mixed several of the firms dealing in these materials will, at a reasonable cost per ton, mix the lick to the desired prescription if the ingredients are purchased from them.

I strongly advise graziers to give this matter of an economical lick more attention. That it is profitable is undoubted, and any expense having due regard to economy which makes for the health of the flock is returned to the grower in overflowing measure.

SIX-SIDED PADDOCKS.

To calculate roughly the area of a six-sided block—for the purposes, say, of a ringbarking contract—add together the length of all the sides in chains. If the shape of the block is regular—with about as much breadth as length—add half as much again. If the length is about twice the breadth, add nothing. Divide the result in chains by 10 to get the area in acres.

Dentition of the Pig.

E. J. SHELTON, Senior Instructor in Pig Raising.

IT is a condition of entry of live stock at agricultural shows, and also sometimes in carcass competitions, that the age of the animal be stated as at a certain specified date. In Queensland and Victoria the councils of the principal agricultural societies have provided, in order to avoid as much trouble as possible, to have the age of all pigs entered calculated to date of judging. For entry at the Royal Easter Show, Sydney, the regulation governing age provides that the age of all pigs is to be calculated from the birth date shown in the litter registration in the herd book to the date of judging at the annual show. This certainly is a great advantage, and is emphasised as worth emulation at other shows, from the standpoint of the exhibitor, judge, and the general public.

It is customary also at these shows to provide that the society's veterinary surgeon's decision be final on matters regarding age. At Melbourne Show the special provision is included that exhibitors may be disqualified and debarred from further competition for any breach of the regulations regarding the age of exhibits.

Several years ago the Council of the National Pig Breeders' Society of England embodied in their herd books a regulation dealing with the dentition of the pig, the objective being to provide a guide for the use of show societies if, and when, the question arose as to the age of an exhibit in the pig classes. These regulations have since been amended, but power is provided for stewards, at the request of the judge, to have the state of the dentition of an animal examined by a competent authority, when, if the decision of this authority indicates that the age of the pig as stated does not agree with the dentition tests, the stewards may report to the council with a view to having the animal disqualified. It has not been necessary to do this actually, except on rare occasions, at Australian shows, but a knowledge that a dentition test might be applied may act as a deterrent to breeders tempted to put the age "back a bit" in their show entry.

Thus the period of cutting of the teeth and the arrangement of the teeth in the mouth of the pig becomes an important subject, although inspection of the mouth of the pig is carried out with difficulty, and may not be relied on to the same extent as it is in the case of the horse (in particular), in which correct age is of great value. The age of the horse has for many generations been estimated by the state of dentition at time of examination.

The subject is again emphasised for the reason that at practically every show, especially the larger annual shows, the question of an animal's age becomes a most important one where competition is keen, and perhaps may be a deciding factor. Unfortunately, it sometimes happens that there may be expressed grave doubts as to the real age of any particular competing animal.

It is not claimed that the test of dentition as applied by the official veterinary surgeon will settle all arguments, but it often happens that expert opinion goes a long way towards giving satisfaction. In that sense, a knowledge of the subject will be of value to readers interested in

the exhibition of stud pigs, especially those between the ages of three and twelve months, the ages at which most of the variation of opinion occurs.

It must be remembered, of course, that the dentition of the pig—the development and growth of the teeth—is very largely influenced by the early, late, or retarded development of the animal. Hence the dentition test should never be considered as more than a fair guide to the real age; in fact, conditions in regard to feeding, handling, and exhibition vary so greatly that it is doubtful whether a dentition test would be regarded as legally binding on the party concerned. There is, however, a desire on the part of many breeders for some reliable information on this subject of the teeth as a guide to the correct age; hence these notes.

The Teeth of the Pig.

In its mature form the pig has forty-four teeth, including six incisors and two tusks on the upper jaw and six incisors and two tusks on the lower jaw. The permanent teeth in the animal's mouth are:—The middle pair of incisors, termed the centrals; the two incisors on each side of the centrals, called laterals; and the two outer incisors, called corners.

The incisors are the single or biting teeth which, as stated, occupy the front part of the jaws. The tusks are the long pointed teeth on each side of the upper and lower jaw behind the corner incisors, while the molars are the double or grinding teeth placed at the back of the jaw. There are, therefore, twelve incisors, four tusks, also referred to as canine teeth, four pre-molars, and twenty-four molars, six on each side of the upper and lower jaw. The tusks in the male are much better developed than in the female.

At birth the pig has eight teeth—four in each jaw—two corner incisors and two tusks. These are small pointed needle-like teeth; the tusks are dark in colour. It is advised to nip off these sharp, needle teeth if the suckers fight and tear the sow's teats.

The milk teeth are the temporary first set of teeth; they are small, white in colour, and, in due course, are replaced by the permanent teeth.

The following is the state of dentition in pigs which would be considered as a guide in indicating that the animals exceed the age specified below:—

Six Months.—Pigs having any one of their corner permanent incisors cut will be considered as exceeding this age.

Nine Months.—Pigs having their permanent tusks more than half up will be considered as exceeding this age.

Twelve Months.—Pigs having their central permanent incisors up and any of the three first permanent molars cut will be considered as exceeding this age.

Fifteen Months.—Pigs having their lateral temporary incisors shed and the permanent appearing will be considered as exceeding this age.

Eighteen Months.—Pigs having their lateral permanent incisors fully up will be considered as exceeding this age.

Age.	Number.	Incisors. Temporary.	Number.	Molars. Temporary.	Tusks.	Number.			Remarks.
						Temp.	Perm.	Total.	
Period.		Position.		Position.					
Birth ..	4	Corner ..	..	..	Temp. ..	8	..	..	This chart is after Banham and is fairly reliable and a quick method of refreshing memory.
1 month ..	4	Central ..	12	1st, 2nd, 3rd ..	Temp. ..	24	..	..	
3 months ..	3	Lateral ..	..	Permanent ..	Temp. ..	28	..	28	
6 months ..	..	Permanent	4	Permanent Molars 4th Perm. Molars	Temp. ..	P.	8	36	
9 months ..	4	4 Corner ..	4	5th Perm. Molars	4 Perm.	20	20	40	
12 months ..	4	Central ..	..	..	..	16	24	40	
15 months ..	..	..	12	1st, 2nd, 3rd ..	..	4	36	40	
18 months ..	4	Lateral ..	4	6th	..	0	44	44	

From the foregoing and from a study of the accompanying illustrations, it will be observed that there are several groups of teeth in the pig's mouth which change as the animal advances in age from birth to maturity.

In a description of these teeth, Sir G. T. Browne, in his manual on "The Pig," discusses the subject as follows:—

When dentition is perfect, the pig has six incisor teeth in the front of both upper and lower jaws—two central, two lateral, and two corner teeth. Behind the corner teeth are the tusks—one on each side top and bottom.

Between the tusks and the molar teeth there are usually four small teeth which are described as pre-molars, one on each side of both jaws; and twenty-four molars, six on each side of the upper and lower jaws.

Temporary and permanent incisors agree generally in number, form, and position, but the temporary molars are only three in number on each side of the upper and lower jaws, and the third molar has three cusps instead of two. The temporary tusks are much smaller and more pointed than the permanent teeth which replace them, and the pre-molars are not represented by temporary teeth, but are permanent from the first. It may be observed that no difficulty is found by the experts in distinguishing the permanent incisors from the temporary organs, especially when both orders are in the mouth together. This distinction is not, however, so marked as to secure the tyro from risk of error.

At birth (Plate 152) the sharp-pointed teeth are laterally placed in each jaw, top and bottom, leaving an open space in the front of the

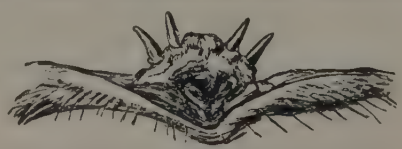
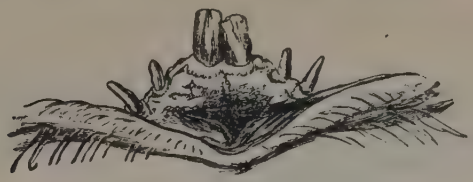


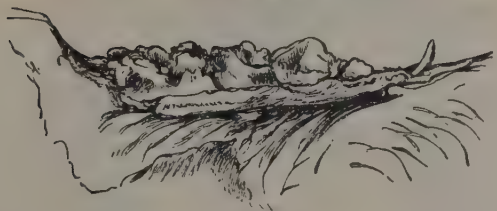
PLATE 152.—TEETH OF PIG AT BIRTH.

mouth. The teeth much resemble small tusks; they are really the temporary tusk and corner incisor; the temporary molars are immediately under the gum, and in the dried specimen they can be distinctly seen in their relative positions.

At one month old the three temporary molars on each side of the jaw, top and bottom, are cut, the second and third in position being well up, the first one just appearing through the gum; at the same time the two central temporary incisors in each jaw are cut, as shown in the illustration (Plate 153).



A. Incisors.



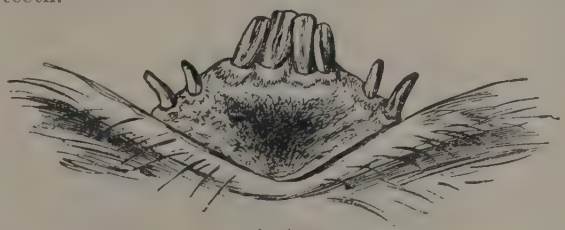
B. Molars.

PLATE 153.—INCISORS AND MOLARS OF PIG AT ONE MONTH.

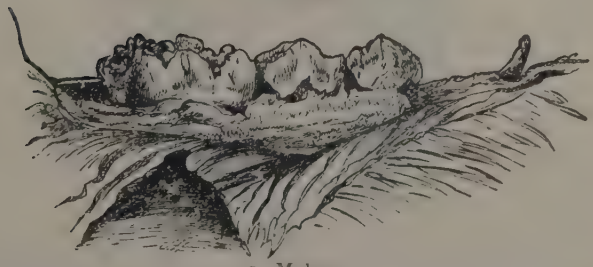
At two months old the temporary central incisors are fully developed, and there are signs of the eruption of the lateral temporary incisors, which generally pierce the gums soon after two months. The first temporary molar is now nearly level with the second.

At three months old the pig has the temporary set of teeth fully developed, the lateral incisors by this time being nearly level with the centrals. The temporary corner teeth and the tusks are further removed from each other than they were at birth, owing to the growth of the jaw. In Plate 154 the state of the teeth at three months old is indicated.

Excepting the natural growth of the jaws, in common with other parts, no changes occur which will assist the examiner in judging the age of the young pigs until the age of five months is reached. At this time there are evident signs of the cutting of the pre-molars; and the fourth molar, which is the first permanent tooth, is seen behind the temporary teeth.



A. Incisors.



B. Molars.

PLATE 154.—INCISORS AND MOLARS OF PIG AT THREE MONTHS.

The illustration (Plate 155) shows the state of the molars at the age of six months.

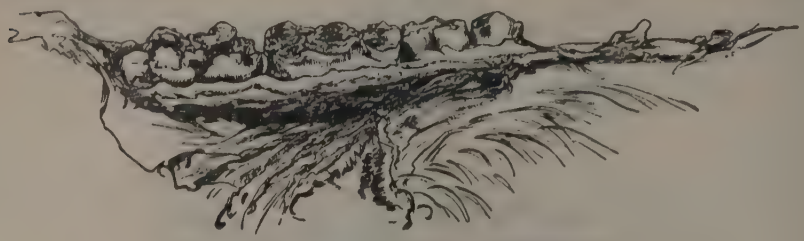


PLATE 155.—MOLARS OF PIG AT SIX MONTHS.

It should be noted that the pre-molars are not always developed, and in the same litters one or two pigs may be found occasionally in which this tooth is absent. The fourth molar is, however, remarkably regular in its appearance, and may be referred to for the purpose of solving any doubt which may arise in consequence of the absence of the pre-molars.

PLATE 156.—MOLARS OF PIG AT NINE MONTHS.

At nine months the corner permanent teeth are well up, and the permanent tusks may be through the gum in very forward animals at this age. The drawings (Plates 156 and 157) show the state of the teeth at nine months.

PLATE 157.—TEMPORARY INCISORS AND TUSKS OF PIG AT NINE MONTHS.

The fifth molar tooth is always cut between ten and twelve months, and its perfect eruption may be taken as evidence that the pig has reached the age of one year. In the illustration (Plate 158) the recently-cut central incisors are shown—a state of dentition which is seen only in very forward animals at the completion of one year of age.

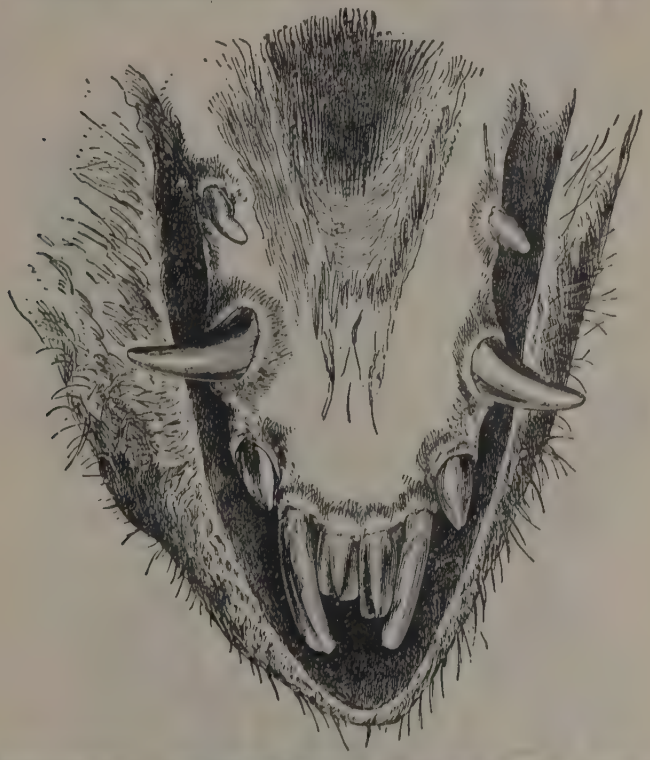


Plate 158.—Central Permanent Incisors and Tusks of Pig at One Year (Early Dentition).

Shortly after the completion of one year the three anterior temporary molars fall irregularly, and by the time the animal is fifteen months old the three anterior permanent molars are in the mouth, and may readily be known by their sharp, unworn points and their recent appearance, as shown in the next illustration (Plate 159). These teeth are very regular in their development and afford valuable evidence in cases where an opinion cannot be formed from an inspection of the incisors alone.

The next change in the dentition is the final one, and occurs between the age of seventeen and eighteen months. At this period the sixth molar, a permanent tooth, is cut, and in forward animals the lateral temporary incisors are changed for permanent teeth. In many instances the temporary lateral teeth remain up to the age of eighteen months, although they are in such cases quite loose, and very often the permanent teeth are cutting through the gum below or by the side of them; in other instances one lateral is found to be fully up and nearly level with the centrals, while the other is just pushing through the gums. The sixth

molar also is fairly well up, but the posterior part of its crown is not quite clear from the gum. These changes complete the permanent dentition of the pig, and there are no indications of the age afforded by the teeth after this period excepting such as depend on the growth and wear of the organs.

PLATE 159.—TEETH OF PIG AT FIFTEEN MONTHS; THE THREE PERMANENT ANTERIOR MOLARS RECENTLY CUT.

In Plate 160, the sixth molar is shown as it appears at the completion of the age of eighteen months.

It is very important to note that the greatest care is necessary in the inspection of the teeth of pigs which are exhibited in the class above twelve and not exceeding eighteen months old. Animals are entered at various ages from twelve to eighteen months; it is necessary, therefore, in this class to note the condition of the central incisors and the anterior molars as well as that of the lateral incisors and the sixth molar. In Plate 161 the full development of the lateral permanent incisors is shown. This state of dentition, it may be remarked, is indicative of a year and eight months.

At the age of two years, the lateral permanent incisors are quite level with the centrals, and are worn on their edges; the sixth molar now

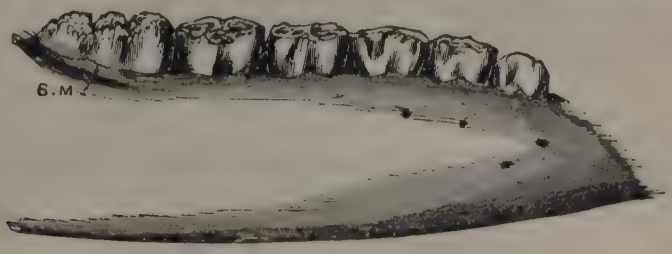


Plate 160.—Molars of Pig at Eighteen Months; Sixth Molar Well Up.

stands quite free from contact with the angle of the jaw, and indications of wear may be observed on the upper surface of the other molars. After the pig has attained the age of two years, an opinion as to the age must

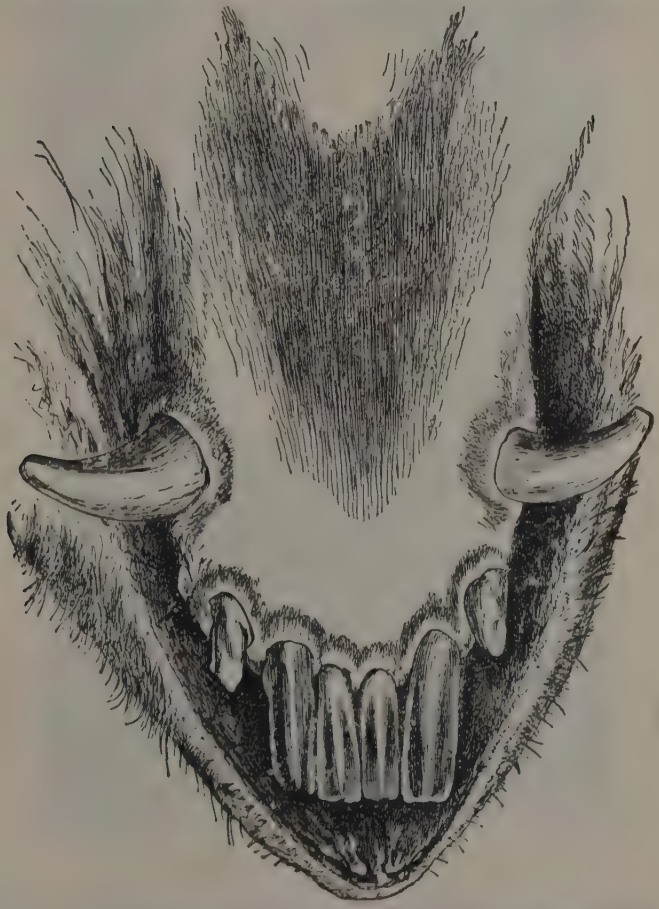


Plate 161.—Incisors and Tusks of Pig at One Year and Eight Months; Lateral Permanent Incisors Well Up.

be to a great extent speculative. The wear which the teeth undergo, the darkening of their colour, and the growth of the tusks, will afford some evidence which will assist the judgment, but there are no changes which can be referred to as indicative of the exact age of the pig after the lateral incisors and the six molars are fully developed.

PLATE 162.—A SCENE ON A FASSIFERN FARM.

LIST OF REGISTERED STALLIONS.

Subjoined is a list of stallions in respect of which Certificates of Registration were issued under "*The Stallions Registration Acts, 1923 to 1934*," during the year 1934-35 :—

BLOOD STALLIONS CERTIFICATED FOR LIFE DURING THE YEAR 1934-35.

Name.	No.	Age.	Description.	Owner.
Ajalon	1093	5	Brown or black	J. L. Porter, Kandanga
All Alone	1107	6	Dark chestnut	R. Ryan, Gympie
Amazing	1341	Aged	Chestnut ..	C. L. Schilling, Bowen
Archie	1360	Aged	Bay	H. K. McKay, Pinnacle
Banker	1302	5	Brown ..	M. R. Shannon, Olive Downs, Nebo
Bicryer	1279	7	Bay	M. Ryan, Linville
Bold Syce	1281	Aged	Brown ..	W. Yorston, Maryvale
Bonnie Error ..	1047	6	Brown ..	R. W. Gordon, Drayton street, Allora
Boonallen	1057	Aged	Black ..	A. B. Parker, Limevale
Brocardo	1256	6	Black ..	C. Campbell, Rolleston
Cantrip	1340	Aged	Chestnut ..	F. G. Isdell, Havilah Station, Collinsville
Centauri	1255	5	Chestnut ..	F. C. Lawton, care of A. G. Anderson, Hendra
Chan Lin	1098	Aged	Bay	Atherton Brothers, Proston
Cool Day	1035	Aged	Bay	Bailey Brothers, "Foxborough," Talwood
Dooville	1367	Aged	Chestnut ..	A. D. Shannon, Oxford Downs, Nebo
Eclipse	1300	6	Brown ..	John Anderson, Theodore
Emblem	1307	5	Brown ..	J. S. Clewley, Ubobo
Eudorburn	1104	5	Chestnut ..	J. D. Bowen, Torbanlea
Eulorbar	1308	Aged	Brown ..	Mace and Son, Toorilla
Fisherdale	1276	Aged	Bay	D. Cullen, Pampas
Gallipoli's Pride ..	1057	Aged	Bay	Nicholson and Biddle, Goondiwindi
Golden Love ..	1339	5	Bay	W. T. Wharton and Company, Collinsville
Hal Tor	1056	5	Chestnut ..	Mrs. S. M. Noye, Warwick
Hiban King ..	1309	Aged	Chestnut ..	C. F. Stapp and Sons, Marlborough
High Standard ..	1262	5	Brown ..	J. W. Wallace, Doncaster street, Toowoomba
Index	1110	Aged	Bay or brown	M. L. Wagner, Mount Perry
Inglestone	1054	Aged	Grey ..	W. R. Munro, Winton, Goondiwindi
Jolly Gozard ..	1362	Aged	Bay	C. Knobel, Silent Grove, Mount Pelion
Kerpad	1310	Aged	Chestnut ..	Gorman Brothers, Edungalba
King's Speech ..	1312	Aged	Bay	Beak Pastoral Co., Wilangle
Kingville	1313	Aged	Bay	A. Shannon, Saltbush Park
Kintrocket	1264	5	Brown ..	W. Corden, Wau, New Guinea
Koo-Wong	1314	Aged	Bay	J. Gray, "Hexham," Yeppoon
Ladallan	1315	Aged	Brown ..	F. J. C. Brown, Bombandy
Laurel Crown ..	1364	Aged	Bay	E. Hermon, Aberdeen, North Eton
Maloola Laddie ..	1114	Aged	Brown ..	E. H. Steele, Wolvi, Gympie
Matutor	1112	Aged	Bay	F. R. Jamieson, Gundiah
Mondillion	1317	6	Bay	J. J. Smith, Roma Peak, Bowen
Moonmera	1118	Aged	Chestnut ..	Hanraban Brothers, Wycarbah
Mr. Speaker ..	1265	5	Bay	T. J. Brosnan and J. J. Moore, Ascot
Norma's Lad ..	1321	5	Brown ..	D. J. Nolan, 75 Kent street, Rockhampton
One	1345	6	Bay	Beak Pastoral Co., Bowen
Palomond	1063	Aged	Bay	Mrs. C. B. Watkins, Killarney
Perfect Light ..	1067	Aged	Bay	G. Amor, Noonge, Jackson
Rightaway	1268	5	Brown ..	E. E. D. White, Bluff Down, Charters Towers
Rivoli B.	1325	Aged	Black ..	J. S. Hutchison, Theodore
Salt Shrine	1269	6	Brown ..	Dr. O'Neill, Townsville
Sarcoe	1327	Aged	Grey ..	Beak Pastoral Co., Wilangle
Sasin	1370	Aged	Chestnut ..	R. W. Perry, Nebo
Scotch Force ..	1064	5	Bay	E. Farmer, Gladstone
Simercian	1348	Aged	Bay	F. E. Schilling, Bowen
Sir Dini	1069	5	Chestnut ..	M. Coonan, Pittsworth
Sir Hinkler	1091	Aged	Brown ..	F. T. W. Stokes, Mount Walker West
Sir Oxford	1366	Aged	Chestnut ..	A. D. Shannon, Oxford Downs, Nebo
Spearall	1271	6	Brown ..	P. J. Mayne, care of A. G. Anderson, Hendra
Springfield	1036	6	Bay	J. Benson, Goondiwindi
Star Deer	1274	5	Brown ..	W. J. Noud, Ascot
Strange Idea ..	1296	5	Chestnut ..	A. G. Anderson, Hendra
Syce Downs ..	1127	5	Chestnut ..	Burton Brothers, Kingaroy
Tabragalba Lad ..	1070	5	Bay	Cooper and Sons, Warra
The Askari	1044	5	Chestnut ..	H. W. Dight, Whetstone
Taranto	1330	Aged	Cream ..	T. N. House, Theodore
Trackertino ..	1299	Aged	Black ..	T. Copley, Stanley House, Esk
Tredwell	1331	Aged	Bay	A. Shannon, Saltbush Park
Truby King ..	1554	Aged	Bay	M. McCormack, Box 71, Proserpine
Vain Prince	1338	Aged	Brown ..	J. B. Shannon, Tooloombah
Waiburra	1333	Aged	Chestnut ..	W. Drynan, Many Peaks
Western Lad ..	1324	Aged	Brown ..	W. J. Hammond, Littlemore
Wet	1277	5	Bay	F. T. Guy, Hendra
Whittier Star ..	1081	6	Chestnut ..	H. Parkinson, Toowoomba
Woodripe	1335	Aged	Brown ..	J. L. Clifford, Charnwood, Lowmead
Yarrester	1038	Aged	Brown ..	A. J. Boyce, Graymere
Young Maloola ..	1128	5	Bay or brown	P. Jeppson, Patterson, North Coast Line
Young Rattrap ..	1040	Aged	Chestnut ..	Browne Brothers, Loch Lomond, Yangan

DRAUGHT STALLIONS CERTIFICATED FOR LIFE DURING THE YEAR 1934-35.

Name.	No.	Age.	Description.	Owner.
Admiral's Joker	1258	5	Brown	R. Roberts, Beerwah
Baron King	1350	Aged	Bay	J. C. Jensen, Don River, Bowen
Bay Baronet	1094	5	Bay	Mulholland Brothers, Gympie
Beau Ideal	1278	5	Bay	P. J. McCauley, Neurum
Black Watch	1067	5	Black	P. C. Thomas, Coraki, New South Wales
Bob	1280	5	Brown	A. Kunde, Hazeldean
Bonny Willie	1095	5	Bay	C. T. Griggs, Muan
Brave Lad	1282	5	Bay	J. F. Kowaltzke, Blenheim
British Earl	1096	5	Bay	G. Wilkie, Binjour, Plateau
Captain	1283	5	Brown	D. McCarroll, Murrumba
Captain	1284	5	Black	W. Jackwitz, Mount Berriman, Laidley.
Captain	1259	5	Brown	W. G. Rudd, Mudgeeraba
Captain Pink	1303	Aged	Brown	B. Wagner and Co., Marylands
Chancellor	1084	5	Bay	S. H. Plant, Cooyar
Clinker	1074	5	Bay	A. J. Harris, Yarranlea
Clyde	1352	5	Bay	R. W. Miller, Box 198, Bowen
Clydebank	1077	Aged	Bay	Mrs. M. E. Leahy, Bon Accord, Dalby
Crown Head	1242	5	Bay	Florence A. Sproule, Guthalungra
Crusader	1049	6	Brown	L. E. and C. J. Taylor, Kooroongarra, Esk
Crystal	1305	Aged	Bay	Mace and Son, Toorilla
Daddy	1356	6	Chestnut	D. Hadlow, Kelsey Creek, Proserpine
Donald	1100	Aged	Brown	E. J. Morris, Gleneden, Humphrey
Double Top	1055	Aged	Bay or brown	C. J. Neilson, Yangan
Douglas II	1101	Aged	Bay	A. Kamholtz, Memerambi
Duke	1306	Aged	Bay	Mossman, J., Miriam Vale
Duke	1102	Aged	Bay	W. C. Hotton, Reid's Creek, Gayndah
Duke	1103	Aged	Bay	Atherton Brothers, Proston
Duke of Sunnyside	1068	5	Bay	W. F. Burge, Gomorran, *via* Goombungee
Gibson Lad	1083	6	Bay	W. H. Pickthorne, Chinchilla
Glenbar Square Dale Yet	1051	5	Bay	A. Jensen, Swanfels
Glen Dale	1075	5	Roan	J. F. Hayden, Shirley, Crow's Nest Line
Glenella II	1261	Aged	Bay	J. Maloney, Rathdowney
Glenmore	1066	5	Bay	F. P. Alexander, Inverai, *via* Warra
Glentyre General	1105	Aged	Bay	S. G. Ball, Kapaldo
Gordon Craig	1257	Aged	Black	J. Hession, Oxenford
Happy Choice	1260	Aged	Bay, white hairs	J. M. Smith, North Otago, New Zealand
Hustler	1355	Aged	Roan	C. W. Faust, Proserpine
Johnny Walker	1106	5	Brown	F. Hebbel, Tableland, Murgon
King Bruce III.	1108	5	Bay	J. J. Beetham, Deep Creek, Kingaroy
King Godfrey	1086	5	Bay	J. W. Rush, Dulacca
King's Hope	1311	Aged	Bay	B. Wagner, Marylands
Lion	1287	5	Bay	A. Langton, Cooyar
Lord Bute	1316	6	Bay	A. Shannon, Saltbush Park
Lord o' the Hills	1050	5	Bay	E. Hindmarsh, Lyra
Major	1111	Aged	Bay	D. Blackburn, Mundubbera
Major's Pride	1289	Aged	Grey	S. Andrew, Laidley
Marshall Intent	1346	6	Bay	R. Smith, Bowen
Monty	1317	5	Brown	S. Graham, Theodore
Nelson	1290	Aged	Bay	J. A. Montgomery, Laidley
Nelson	1045	Aged	Brown	G. W. F. Goodrich, Warroo, Inglewood
Nobby's Pride	1073	5	Bay	L. Ferguson, Nobby
Noble	1291	5	Bay	J. W. Schultz, Wheeler's Crossing, *via* Esk
Noble	1319	5	Black	W. J. Kelly, Banksia
Noble	1320	5	Bay	W. Carmichael, Calliope
Noble	1115	Aged	Bay	Elliott Brothers, Goomboorian
Noble King	1359	5	Bay	J. R. Peoples, Finch Hatton
Noble Lad	1116	5	Brown	J. V. Bernier, Proston
Norman	1292	Aged	Black	C. Griffiths, Croitby, Boonah
Orphan Boy	1372	Aged	Bay	J. C. Bowman, Pleystowe
Popinjay	1323	Aged	Bay	C. and S. C. Becker, Theodore
Premier's Pride	1324	5	Brown	W. Wilson, Jambin
Prince	1120	5	Bay	R. Williams, Crawford
Prince	1121	6	Bay	J. E. Bandholz, Antigua
Prince	1363	Aged	Grey	B. F. Hogan, Mirani
Prince Charles	1059	5	Bay	J. E. Roberts, Wildash, Warwick
Punch	1293	Aged	Chestnut	W. Webster, Kilcoy
Punch	1109	Aged	Brown	W. Hobson, Sandy Creek, Kilcoy
Rhubarb	1267	5	Brown	A. J. Drynan, Beaudesert
Rising Sun	1123	5	Bay	T. Dingle, Drummer's Creek, Mount Perry
Rob	1294	6	Bay	F. G. Zupt, Boonah
Robin Wallace	1124	6	Bay	W. H. O. Smith, Ceratodus
Rover	1089	6	Bay	A. J. Specht, Wellcamp
Royal Blue	1080	5	Grey	W. P. O'Sullivan, Ascot, *via* Greenmount
Royal Chance	1085	5	Bay	W. J. Prasser, Jondaryan
Royal Dale	1295	5	Bay	O. P. Kanotski, Ipswich
Samson	1326	Aged	Bay	E. J. Angel, Glengarry, Merimal
Scamp	1328	5	Black	H. E. Horne, Cracow
Scotchman	1343	Aged	Bay	G. J. Fischer, 86½ Mile, Bowen Line
Sergeant's Orphan	1253	5	Brown	E. W. Simmich, Maroon
Shepherd's Pride	1042	5	Bay	G. E. Crane, Elbow Valley, Warwick
Sheppard's Prince	1072	7	Bay	S. T. Evans, Chinchilla
Sir Douglas	1125	5	Bay	Honey and Braithwaite, Murgon

DRAUGHT STALLIONS CERTIFICATED FOR LIFE DURING THE YEAR 1934-35—*continued.*

Name.	No.	Age.	Description.	Owner.
St Helen's Piper ..	1034	5	Bay	S. A. Perrett, Flinders, Fassifern Line
St. Helen's Rob Roy	1126	5	Bay	J. Newman, Alice Creek, Kingaroy
Stanmore	1060	Aged	Bay	M. B. Ruming, Upper Pilton
Star	1344	Aged	Bay	F. G. Day, Gumlu
Talgai Wallace ..	1297	5	Brown ..	W. Profke, Glamorgan Vale
Torilla	1329	Aged	Black ..	Greycliffe Estates, Rannes
Verdew	1042	5	Bay	W. J. O. Dempsey, Upper Freestone
Widgiewa Lad ..	1046	6	Bay	R. W. Gordon, Drayton street, Allora
Worawingeth Dignity	1071	5	Bay	A. F. Creswick, St. Helen's, Pittsworth
Young Monk ..	1336	Aged	Bay	Coochin Estate, Cambooya
Young Wallace ..	1063	5	Brown ..	D. Harrison, "Palestine," Muttaburra

PONY STALLIONS CERTIFICATED FOR LIFE DURING THE YEAR 1934-35.

Billy	1353	Aged	Bay	L. W. Williams, Don River, Bowen
Bluff	1371	6	Grey	A. H. Ferguson, St. Albans, Nebo
Decorum	1099	5	Bay	Honey and Braithwaite, Murgon
Dan Dooloogra ..	1351	Aged	Grey ..	J. C. Jensen, Don River, Bowen
Ding Dong	1078	5	Bay	J. C. Mann, Yarranica
Ebony	1061	5	Dark brown..	E. Taylor, Fletcher
Eclipse	1053	5	Taffy	J. Mullins, Mill Hill, Warwick
Firelight II. ..	1252	Aged	Bay	L. Hogarth, Stonehenge
Grey Wonder ..	1041	Aged	Grey ..	W. Caton, Legume, N.S.W.
Haired	1286	5	Bay	E. G. Smith, Toogoolawah
Inchcape	1263	5	Brown ..	K. Lowe, Burpengary
Jimed	1082	6	Brown ..	Mrs. E. Pearce, 247 Hume street, Toowoomba
Little Dick	1288	Aged	Black ..	J. R. Doorey, Laidley
Little Tim	1052	5	Taffy	D. J. Lewis, Warwick
Little Tim	1079	6	Bay	F. C. Marshall, Whichello
May Duke of Pennywell (imp.)	1088	Aged	Black ..	Eva M. Sherwin, Birrilll, Brookstead
Merrybow	1039	5	Bay	A. R. Brydon, Glencoe, Yelarbon
Nigger	1058	Aged	Black ..	H. Rabbitt, Inglewood
Night Raid ..	1076	5	Bay	H. Hock, Bunya street, Dalby
Pento	1118	5	Cream ..	A. Skyring, Kinbombi
Petite's Pride ..	1119	5	Bay	A. O. Harm, Byee, *via* Murgon
Pilot	1368	6	Rebald ..	A. J. McLean, Nebo
Raisuli	1048	Aged	Chestnut ..	A. C. McDougall, Miles
Ranger	1349	Aged	Roan	D. S. Miller, Don River, Bowen
Regal Son	1122	6	Bay	L. C. Walker, Bundaberg
Saharas	1369	Aged	Bay	H. Crawford, Mount Robert, Nebo
Selin	1357	6	Brown ..	E. G. Lascelles, Proserpine
Sonny Boy	1361	Aged	Bay	W. Vicary, Finch Hatton
Sonny Watch ..	1358	Aged	Brown ..	F. S. Crease, North Side, Mackay
Tibby	1298	5	Brown ..	H. Weigel, Hatton Vale, *via* Laidley

TROTTER STALLIONS CERTIFICATED FOR LIFE DURING THE YEAR 1934-35.

Abe	1254	6	Brown ..	L. Riesenweber, Jacob's Well
All Chimes	1087	Aged	Black ..	J. C. Schweikert, Milmerran
Broadarrow	1090	5	Bay	F. T. Walker, Darriwell, Bell
Broadcast	1097	5	Brown ..	E. Ricketts, Walker street, Bundaberg
Gay Night	1285	5	Brown ..	M. Robeck, Rockside, Gatton
Hinkler	1365	Aged	Bay	S. McNamara, Homebush
McKinney's Pride	1373	Aged	Bay	Mrs. M. Ruddy, Childers
Paddy Wilkes ..	1266	5	Brown ..	M. F. Postich, Warra
Sir Beldon II. ..	1270	5	Chestnut roan	F. R. Baxter, Morningside
Wolston Hall ..	1273	Aged	Black ..	J. Campbell, Djuan

BLOOD STALLIONS CERTIFICATED FOR THE YEAR 1934-35.

Ambermond	4	Bay	C. R. S. Smith, Mount Joseph, Brooweena
Arboreal	4	Bay	M. Ryan, Ascot Chambers, Brisbane
Ardon's Pride	3	Brown ..	W. J. Tucker, Hendra
Bachelor's Heir	4	Chestnut ..	K. Brennan, Croftby, *via* Boonah
Bachelor's Lodge	4	Bay	W. Redman, Braemar, Warra
Ben Art	3	Chestnut ..	Miss M. Stevens and A. G. Anderson, Hendra
Bonney Clyde	3	Brown ..	W. Gilmore, Allora
Boropolis	4	Brown ..	Scott Brothers, Wandoan
Brownlee	3	Brown ..	W. H. Smith, Ubobo
Brown Poitrel	3	Bay or brown	A. G. Cross, Ellesmere, Kingaroy
Burnlad	4	Chestnut ..	J. L. Cantwell, Chinchilla
Byramjee	4	Brown ..	F. Black, care of C. Connell, Manson road, Hendra
Dalmain	4	Brown ..	A. P. Gibson, Boolboonda, Mount Perry Line
Dan Scorn	3	Brown ..	J. McLean, Watalgan
De Letle	4	Bay	W. Dingle, Drummer's Creek, Mount Perry
Dennis Lad	4	Chestnut ..	G. E. Crane, Elbow Valley, Warwick
Don's Price	3	Brown ..	C. Svensen, Walker street, Bundaberg
Dulnatic	3	Bay	J. Drinan, Wallaville
Flying Painter	4	Bay	W. T. Gillies, Cooyar
Forceona	4	Grey	R. J. Spence, Muttaburra

BLOOD STALLIONS CERTIFICATED FOR THE YEAR 1934-35—*continued.*

Name.	No.	Age.	Description.	Owner.
Gallant Blanck		3	Bay	D. C. Cameron, Le Geyt street, Windsor
Glengarry		3	Brown	W. C. Dickinson and Sons, Glengarry, Nagoorin
Glenstock		4	Bay	Cook and Cook, Wandoo Station, *via* Koumala
Glen's Spear		3	Brown	G. Cameron, Marian
Graceville		4	Brown	F. J. C. Brown, Bombandy
Guy Fawkes		4	Chestnut	J. P. Walsh, Mount Perry
Hastate		3	Brown	W. A. Collins, Cairns
High Gain		4	Brown	Rees and White, Surat
Jean Jacques		4	Chestnut	W. Bullock, Booval
Jehad		4	Chestnut	W. G. Hein, James street, Howard
Jigga Jigga		Aged	Bay	A. D. Shannon, Oxford Downs, Nebo
King Baralong		4	Brown	D. C. Cameron, Le Geyt street, Windsor
Layman		4	Chestnut	J. Redmond, Beaudesert
Leolita		4	Bay	T. J. Jennings, Greenmount
Leon D'Or		3	Brown or bay	C. Faircloth, Booval, Ipswich
Mane Berd		4	Bay	R. Devlin, Mill Hill, Warwick
Master Persse		3	Chestnut	E. J. Griffiths, Mount Forbes
Maxie		4	Chestnut	C. H. Gear, Bingera road, Bundaberg
Memorial		4	Bay	T. Pownall and Pownall, Monto
Menelaus		3	Brown	A. G. Anderson, Hendra
Mervyn's Choice		3	Bay	T. J. Turkington, Wattle Brae, Nobby
Mount Lad		3	Grey	A. D. Orr, Mount Irving, *via* Oakey
Oregyn		5	Chestnut	A. Adie, Post Office, Childers
Pandion		3	Brown	I. J. Moore and T. J. Brosnan, Ascot
Pastmaster		3	Brown	C. T. Griggs, Muan
Poitrel Lane		4	Chestnut	T. A. Gardiner, Eulo
Prince Orange		3	Chestnut	S. D. C. Rushbrook, care of Winchcombe, Carson, Charleville
Real Felt		3	Bay	R. Mahaffrey, Grantham
Real Flyer		4	Brown	Collins Brothers, Mount Surprise, Cairns
Repaz		4	Bay	A. N. Zeller, Mount Luke, Crow's Nest Line
Robemond		3	Black	R. Baker, Caboolture
Sage King		4	Brown	N. A. Hoey, Tugun
Scholar		3	Chestnut	C. Clark, New Farm
Sea Laddie		4	Bay	J. Cunningham, "Furmiston," *via* Wowan
Semitic		3	Bay	A. G. Noud, Ascot
Serewick		4	Brown	T. J. Campbell, New Moonta
Sir Bluewin		4	Brown	M. Brosnan, Dragon street, Warwick
Sir Force		4	Bay	A. G. Rowling, Texas
Sir Monarch		3	Brown	T. J. Jennings, Greenmount
Smilax		3	Brown	B. Buckley and J. Murphy, Moynihan street, Ascot
Soft Step		4	Brown	W. J. Tucker, Hendra
Sonny Boy		4	Bay	A. M. Deighton, Mooloo, Gympie
Southern Don		4	Chestnut	D. A. Proctor, Glen Valley, Byrnestown
St. Grafton		4	Brown	J. D. Kirwan, Lisson Grove, Wooloowin
Thalacre		4	Bay	A. F. Campbell, Columboola
Treken		3	Chestnut	S. C. Luck Freestone
Tripple Ring		4	Brown	J. Thompson, Cooktown, North Queensland
Utterer		4	Brown	T. J. Brosnan, Ascot
Warwickeye		4	Black	L. Dixon, Crescent Avenue, Hendra
Wide Bay		3	Bay or brown	C. Clark New Farm
Winaspear		3	Brown	C. Harsant, Radford
Wittabius		4	Chestnut	C. Bergmann, Witta
———		3	Bay	R. Hill and T. Pethers, Unumgar, *via* Kyogle
———		4	Bay	Rawdon, Briggs, and Co., Mount Perry

DRAUGHT STALLIONS CERTIFICATED FOR THE YEAR 1934-35.

Alexander's Pride	3	Bay	H. Alexander, Warra
Audroy Lad	3	Bay	W. Biegel, Rywung
Back Plains Silver Dale	3	Bay	C. E. Lack, Back Plains, Clifton (Provisional)
Banker	4	Bay	G. E. Bassingthwaighte, Jandowae
Baron Fancy	3	Bay	S. Otto, Emu Creek, *via* Crow's Nest
Baron Favour	4	Bay	J. M. Newman, Caboolture
Baroona Musketeer	4	Chestnut	G. Mussig, Pomona
Beau Ideal	3	Bay	A. H. Greenup, Bancroft, *via* Gladstone
Ben	4	Bay	J. Tennyson, Chinchilla
Ben	4	Bay	V. K. Trott, Reid's Creek, Gayndah
Ben Hur	4	Black	M. MacDonnell, South Side, Gympie
Black Prince	3	Black	J. Simmons, Coo-ee-ville, Milmerran
Black Prince	4	Black	D. W. Bell, Beebo
Blaze	3	Bay	E. Armstrong, "Oakwood," Bell
Blaze Dale	4	Brown	A. W. Law, Kuttabul, Mackay
Blossom's Pride	3	Bay	F. P. Alexander, Inverai, *via* Warra
Bluff Wylie	4	Bay	L. Schneider, Boonah
Bob of Abbotsleigh	3	Bay	Estate of W. C. Collins, Rosedale
Bold Boy	4	Bay	L. A. Armstrong, Rosewood
Bold Hero	4	Bay	G. B. Lee, Calvert
Bold Lad	3	Bay	W. F. Pascoe, Ceratodus
Bold Laddie	3	Bay	T. Armstrong, Rosewood
Bold Noble	3	Brown	V. Voigt, Glamorgan Vale
Bold Prince	3	Bay	F. Heise, Minden

DRAUGHT STALLIONS CERTIFICATED FOR THE YEAR 1934-35—*continued.*

Name.	No.	Age.	Description.	Owner.
Bounce		3	Bay	W. Carew, Boole road, Kingaroy
Brilliant Master		3	Brown	R. Stark, Wondai
Brooklyn Keynotes Dignity		3	Bay or brown	T. Brosnan, Killarney
Captain		5	Brown	C. Maas, Waterford (Provisional)
Captain		4	Bay	T. B. Freeman, Columboola
Captain Duke		4	Brown	F. Horne, Springbrook, Linville
Captain Windemere		3	Bay	A. Sippel, Murgon
Carlisle Clinker		3	Black	J. Gilmore, Goomburra
Carlyle Prairie		4	Bay	A. A. Treasure, Brigalow
Chrystal		3	Bay	N. R. Trousdell, Pinelands, Crow's Nest
Clyde Hill Intent		3	Bay	H. F. Steinhardt, Marburg
Clydemere		3	Bay	S. Hartwig, Groomsville, *via* Pechey
Craiglee Again		3	Brown	J. S. Pickering, Black Duck Creek
Crown Duke		3	Bay	R. G. Ruhle, Motley, *via* Oakey
Croy		4	Bay	F. G. Armstrong, Talgai
Crystal Duke		4	Bay	J. Kennedy, Kumbia, *via* Kingaroy
Crystal Hope		4	Bay	G. Telford, Nobby
Crystal Pride		3	Bay	A. F. Watts, Freestone
Cub		3	Bay	G. A. Pollock, North Kolan, *via* Avondale
Darwin		3	Bay	C. Cavanagh (junr.), Kybong
Dole		7	Bay	E. G. Lascelles, Proserpine (Provisional)
Don		4	Bay	J. Toft, Bundaberg
Donald Wallace		3	Brown	D. Birch, Conondale
Don Bradman		4	Bay	C. Jeynes, Glastonbury, Gympie
Don Robin		4	Bay	J. Campbell, Haden
Douglas Best		3	Bay	H. Hoffmeinster, Springsure
Duke		3	Chestnut	G. F. Hicks, Glenella, *via* Mackay
Duke of Invermay		4	Bay	W. E. Challacombe, Condamine
Earl Marshall		3	Bay	A. A. Stokes, Abbotsford, Melbourne
Edgecombe Prince		4	Bay	J. W. Ritter, Mount Tyson
Farmer		3	Bay	H. Hinschen, Acacia Vale, Proserpine
Farmer's Glory		4	Brown	F. W. Abraham, Lark Hill, Gatton (Provisional)
Fairhill Young Champion		Aged	Black	J. Brownlie (senr.), "Fairhill," Warwick
Foot Step		4	Bay	W. Schultz, Flaggy Rock
Gay Lad		3	Bay	G. White, Petrie
General Chief		4	Bay	W. F. Litzow, Tarampa
General Dale		3	Brown	J. V. Willis, Meringandan
Gladfield		4	Black	P. W. Flynn, Clifton
Glendale		3	Brown	J. O'Brien, Glastonbury, Gympie
Glenlad		3	Bay	J. Hirning, Crow's Nest
Golden Charmer		5	Chestnut	A. R. Hanson, Amberley (Provisional)
Grand Major		3	Bay	C. E. Pascoe, Ceratodus
Grand Master		3	Bay	H. Killer, New Moonta
Greenlea Obligata		3	Bay	J. M. Smith, North Otago, New Zealand
Hector		3	Bay	P. S. Brook, Mount Funnell, Koumala (Provisional)
Hendon Bill		4	Brown	G. H. Clarke, Allora
Hermitage Lad		3	Bay	A. A. Gillespie, Swan Hill, Warwick
Hero		3	Chestnut	M. J. Coonan, Lanefield
Intent's Laddie		3	Bay	J. V. Willis, Meringandan
John Bright			Bay	E. G. Lascelles, Proserpine (Provisional)
Johnnie's Son		4	Bay or brown	A. H. Jenkinson, Mundubbera
Jondaryan Carlisle		4	Brown	H. F. Steinhardt, Marburg
Jondaryan Janitor		3	Bay	C. G. Walker, Tarong road, Nanango
Jondaryan Mac		3	Brown	B. G. Kerle, Minden
Kingsford		Aged	Dark bay	J. M. C. Hyde, Tarong road, Nanango (Provisional)
Leo		4	Bay	Ford and Proctor, Coalstoun Lakes, Biggenden
Lion		4	Bay	J. J. Shine, Fernvale
Lochaber Lad		4	Bay	T. Laidley, Mundubbera
Lone Star		3	Bay	Gross Brothers, Campbell's Plains, Warwick
Lord Marmion		4	Bay	G. G. Wilson, Lilydale, Bell
Lord Wheeler		4	Brown	C.Q.M.E. Co., Ltd., Lake's Creek
Major Crystal		3	Bay	H. W. Genrich, Glenavon, *via* Crow's Nest
Major Dale		3	Bay	C. A. Kanofski, Grandchester
Major Wallace		4	Bay	Gross Brothers, Campbell's Plains, Warwick
Major Wallace II.		3	Bay	Walton Brothers, Surat
Major Wyllie		3	Brown	G. C. Reinke, Minden
New Hope		3	Bay	E. Ehrich, Greenmount
Noble		4	Brown	G. Tennyson, Chinchilla
Noble		3	Bay	T. G. O'Meara, Humphrey
Noble Lad		3	Roan	W. J. Ryan, Upper Freestone
Nobleman		3	Iron-grey	J. R. H. Frizzell, Sunnyside, Southbrook
Noble Premier		4	Iron-grey	J. V. B. Jamieson, Netherby
Nugget Brown		3	Bay	F. De Costa, Orkable, *via* Carmila
Oakflat Chancellor		3	Brown	Mitchell and Muckert, Murgon
Our Hope		Aged	Bay	P. Booth, Yarrabine (Provisional)
Patent		4	Brown	J. L. Opperman, Ormeau
Pilot		4	Brown	T. J. Hoey, Brewer's road, Sarina
Pride of Dartmoor		3	Bay	F. W. Whiteway, Carpendale, *via* Helidon
Pride Shepherd		3	Bay	W. F. Weeke, Kleinton
Prince		3	Bay	P. S. Brook, Koumala (Provisional)
Prince		3	Chestnut	J. S. McFarlane, Eton
Prince		4	Bay	Schultz Bros., Neuve, Haden Line

DRAUGHT STALLIONS CERTIFICATED FOR THE YEAR 1934-35—*continued.*

Name.	No.	Age.	Description.	Owner.
Prince		3	Bay	J. W. Bickers, Kurrumbul
Prince Dale		3	Bay	A. D. Shannon, Oxford Downs, Nebo (Provisional)
Prince Meadie		4	Bay or brown	R. E. Pickels, Coolabunia
Prince Thomas		3	Bay	A. Orr, Mount Irvine, Aubigny
Punch		4	Brown	O. Reinke, Rosewood
Renown II.		3	Bay	Mrs. R. V. Breydon, Haden
Retaliator		4	Bay	T. J. Brosnan, Killarney
Revenue		3	Bay	P. Connole, Helidon
Rielly		3	Bay	A. Nolan, Glengallan road, Warwick
Royal Dale		3	Brown	C. A. Sproxton, Maleny
Royal Glencoe		3	Dark-brown	J. M. Thompson (junr.), Stanthorpe
Royal Jock II.		5	Bay	R. W. and O. Kleinschmidt, Hidden Vale (Provisional)
Royal Prince		4	Bay	W. G. Bidgood, Emu Creek, Crow's Nest
Royal Prince		3	Bay	F. J. Stone, Currajong, Gin Gin
Royal Sheppard		4	Bay	O. P. Dowling, Perth street, Toowoomba
Sandy Barton		Aged	Bay	A. D. Shannon, Oxford Downs, Nebo (Provisional)
Sandy Hurst		3	Bay	J. M. Smith, North Otago, New Zealand
Sanguine Select		3	Brown	J. M. Smith, North Otago, New Zealand
Shepherd Hill Prince Charlie		3	Bay	J. H. Kilvington, Glenore Grove
Silver Shield		3	Bay	J. D. Saul, Drillham
Sir Charles		3	Bay	J. Cuddihy, Helidon
Sir Donald		3	Black	J. Wilkinson, Nobby
Sir Richard		3	Bay	J. Armstrong, Wambo, Chinchilla
Snip		3	Bay	J. Stanbury, Proserpine
Special Mac		4	Bay	D. Gibb-McIntosh, Walhalla, Tansey
St. Helen's Brucedale		4	Bay	C. B. Baxley, Tipton, Dalby
Stanley Obligation		3	Bay (grey hairs)	J. M. Smith, North Otago, New Zealand
Star		4	Blue roan	W. Johnston, Strathpine
Stepford Belted Knight		4	Bay	G. S. Miller, Freestone (Provisional)
Talamoniac		3	Bay	Evans Brothers, Oona Vale, Goondiwindi
Talgai Refiner		4	Black	H. C. Sprott, Ellenthorpe
Tarleton Bon Voyage		3	Bay	Jondaryan Estates, Jondaryan
The McIntosh		4	Bay	F. De Costa, Orkabie, *via* Carmila
Tiger		4	Bay	G. M. Gallaty, Gayndah
Tip		Aged	Bay	E. G. Lascelles, Proserpine (Provisional)
Tony		4	Bay or brown	P. Bryce, Wootha
Top Halls		3	Bay	A. Wienholt, Washpool Farm, Kalbar
Trooper Lad		4	Bay	C. L. Schilling, Club Hotel, Bowen
True Blue		4	Bay	M. O'Leary, Fontainebleau, Leyburn
Wallace		4	Bay	G. Stanfield, Proston
Wallace Monarch		3	Bay	J. Murray, Beaudesert
Windermere Cellus		3	Bay	L. C. Walker, Bundaberg
Woodhall Gaiety		3	Bay	R. Stokes, Collingswood, Victoria
Woorilla Regal George		4	Bay	Fairymead Sugar Company, Limited, Bundaberg
Worthy Carlisle		4	Bay	J. Lehmann, Coolana, *via* Rosewood
Yaccum		3	Bay	J. Renwick, Proserpine
Young Banker		Aged	Bay	H. Tones, Sunnyside, Homebush (Provisional)
Young Barron		5	Bay	F. Patteson, care of Walker's Bag, Nanango (Provisional)
Young Dale		4	Bay	J. B. Shannon, Tooloombah
Young Hero		3	Brown	S. Ryan, Pratten
Young Ivanhoe		3	Black	L. N. Kahler, Geham
Young Kingsford		4	Brown	W. A. and M. Scott, Toogoolawah
Young Scotchman		3	Chestnut	J. T. Beal, Loch Lomond, Killarney

PONY STALLIONS CERTIFICATED FOR THE YEAR 1934-35.

Aden's Chief		4	Grey dapple	J. V. Willis, Meringandan
Bonnie Boy		3	Bay	S. Jose, New Moonta
Bonny Lad		3	Brown creamy	J. Perrem, Boonah
Larrikin		4	Dappled taffy	L. Whittington, Oakenden, *via* Homebush
Merrimint		4	Brown	S. Muggleton, Texas
Mog Wamp		Aged	Roan	J. E. B. Dingle, Mount Perry (Provisional)
Nifty Jim		4	Bay	J. Hay, Barivalve, Miriam Vale
Sir Pastel		4	Brown	O. R. Hulton, Cunningham
Spark		4	Black	H. H. Stockill, Goomeri
Spotlight		3	Bay	S. V. Neale, Ramsay, Cambooya
Young Guinea		4	Bay	H. H. Ehlrich, Douglas, *via* Goombungee

TROTTER STALLIONS CERTIFICATED DURING THE YEAR 1934-35.

Bricklayer		4	Bay	Morrell Brothers, Elphinstone
Cedarwood		4	Black	D. Perry, Milimerran
Jewel Cole		4	Brown	F. G. Armstrong, Talgai
Monto Wilkes		3	Brown	A. Thomasson, The Caves, North Coast Line
Sir David		4	Bay	H. G. Gooding, Benowa, Southport
Sparkling Ribbon		3	Bay	P. D. Fiechtner, Ascot, *via* Greenmount
Vale Opera		4	Dark chestnut	L. T. Graham, Boonenbah, *via* Goomeri

LIST OF REJECTED STALLIONS.

List of stallions in respect of which Certificates of Registration were refused, on account of either lack of type and/or conformation, or unsoundness, during the year 1934-35. These horses are prohibited from service, either public or private :—

BLOOD STALLIONS REJECTED DURING YEAR 1934-35.

Name.	No.	Age.	Description.	Owner.
Amberheart		5	Brown	C. Phillott, care of A. G. Anderson, Hendra
Blue Lad		5	Grey	P. J. Ahern, Mount Walker
Bob's March		Aged	Chestnut	J. W. Collins, Beaudesert
Bulayo		Aged	Bay	F. McNeill, Proserpine
Cylis		3	Brown	H. T. Sheppard, Greenbank
Flying Fox		Aged	Bay	A. O. Kunde, Hazeldean, Kilcoy
Happy Lad		6	Brown	H. Robson, Pomona
Hero		5	Chestnut	R. C. Welsh, Utopia, Dalveen
Highland Knight		6	Bay	J. P. Wormwell, Kupunn
King of Moya		3	Bay	J. Rayner, Harrisville
Laristo		Aged	Bay	E. O. Gralow, Alligator Creek, Sarina
Lucky Hit		3	Bay	J. Mallon, Mount Berryman
Mr. Singer		3	Brown	J. Sheppard, Greenbank
Poitrel's Will		4	Brown	G. H. Day, Grandchester
Polystar		4	Chestnut	C. L. O'Brien, Crossdale, Esk
Quertoi		Aged	Chestnut	D. E. Brennan, Jimboomba
Rossbrook		Aged	Brown	J. D. Hogan, Cooranga North, Bell
Seapoy		Aged	Brown	J. Williams, Harlin
Ship		Aged	Chestnut	H. F. Neale, Pittsworth
Stockade		3	Brown	A. Weinholt, Marlborough
———		5	Chestnut	J. D. Roginson, Yarraman
———		5	Bay	W. T. Brown, Calliope
———		3	Bay	J. B. Shannon, Tooloombah
———		4	Bay	C. M. Penrose, Beebo, Texas
Windlap		5	Chestnut	C. Hammond, Ubobo

PONY STALLION REJECTED DURING YEAR 1934-35.

Guinea		4	Chestnut	R. G. Alexander, Warra

TROTTER STALLIONS REJECTED DURING YEAR 1934-35.

Abbey Boy		5	Bay or brown	H. O. Mischke, Grantham
Abbey Chimes		4	Cream	J. C. Schweikert, Millmerran

DRAUGHT STALLIONS REJECTED DURING THE YEAR 1934-35.

Admiral Dale		3	Bay	C. W. Stuhmcke, Mount Tarampa
Allora Intention		3	Bay	M. J. Ryan, Table Top, Allora
Bally		Aged	Bay	McEvoy Brothers, Netherdale
Basher		Aged	Bay	J. Armstrong, Killarney
Ben		Aged	Chestnut	S. Spratt, Okuloo, Finch Hatton
Billy		4	Bay	H. Sutherland, Beaudesert
Bold Baron		Aged	Bay	E. Hinschen, Proserpine
Braw Laddie		Aged	Bay	H. Rasmussen, Bundaberg
Bruce		3	Bay	G. R. Booth, Tirroan
Captain John		4	Bay or brown	T. Clark, Wietalaba
Carlisle Silver		3	Roan	A. J. Miller, Jondaryan
Charlie Boy		5	Bay	J. E. Watts, Rosewood
Crown Prince		Aged	Bay	D. J. McLean, Gumlu
Crystal Boy		Aged	Bay	S. McKay, Pinnacle
Crystal Lad		Aged	Black	L. G. Smart, Mulgeldie
Crystal Sign		6	Bay	W. Gilmore, Allora
David		Aged	Bay	W. J. Castles (junr.), Millmerran
Dawn		Aged	Bay	T. Trebilcock, Chinchilla
Don Pearce		4	Bay	C. Rowland, Burnett Heads, Bundaberg
Duke		5	Bay	A. Kahler, Geham
Duke		Aged	Brown	L. E. Taylor, Kooroongarra
Duncan		Aged	Bay	J. Campbell, Haden
Farmer		Aged	Bay	F. Wockner, Newington, *via* Jondaryan
Felton Hero		Aged	Bay	E. J. Ezzy, Kooroongarra
Fitzroy		5	Bay	P. Egan, "Rosewood," *via* Westwood
Glendon		5	Bay	Mrs. C. J. Thompson, Patrick street, Dalby
Highland Chief		5	Black	A. Treasure, Brigalow
Knight Abbot		5	Brown	F. M. Bell, Coochin Coochin
Lincoln II.		5	Bay or brown	T. Begley, Woodhill
Lord Marmion		4	Bay	B. T. Seymour, Kapaldo
Lord Melray		5	Brown	Hooper and Carrigg, Rannes
Lord Wallace		5	Bay	A. O. Harm, Byee
Major		4	Bay	A. W. Bubke, Dallarnil
Master Renown		3	Brown	J. M. Smith, North Otago, New Zealand
Newtown Baron		4	Bay	J. R. Anderson, Southbrook
Noble		3	Brown	M. W. Campbell, Moore
Perfect Dale		Aged	Bay	S. C. Luck, Freestone
Planet		4	Brown	W. Johnson, Rathdowney
Premier King		5	Bay	R. J. Cleary, Greymare

DRAUGHT STALLIONS REJECTED DURING THE YEAR 1934-35—*continued.*

Name	No.	Age.	Description.	Owner.
Prince	..	Aged	Brown ..	H. Fischer, Mountain View, Jaraga
Prince Arthur ..	..	3	Roan.. ..	W. P. Casey, Milbong, *via* Roadvale
Prince Campbell ..	..	3	Chestnut ..	A. K. Rough, Maleny
Prince of Bellevue..	..	3	Bay	A. O. Bishop, Caboolture
Punch	..	4	Bay	D. Hadlow, Kelsey Creek, Proserpine
Punch	..	Aged	Black ..	H. C. Dougall, Littlemore
Punch	..	Aged	Bay	W. O. Sing, Ubobo
Rambler	..	Aged	Bay	B. Wagner, Marylands
Raven	..	Aged	Black.. ..	Greycliffe Estate, Rannes
Revoley	..	Aged	Bay	A. G. Cross, Kingaroy
Robin	..	5	Bay	W. S. Lumley, Captain Mount, Millmerran
Royal Perfection ..	..	Aged	Bay	Messrs. Beutel and McPhee, Oakey
Royal Rolls Royce	..	Aged	Brown ..	J. Hardy, Eukey
Saltbush	..	Aged	Bay	M. R. Shannon, Olive Downs, Nebo
Sarko	..	Aged	Bay	J. Breen, Yukan, *via* Sarina
Shannon	..	Aged	Bay	E. G. Lascelles, Proserpine
Star	..	Aged	Brown ..	D. Gillespie, Emu Vale
St. Helen's Lauder Dale	..	4	Bay	C. E. Lack, Back Plains, Clifton
Thirty	..	5	Bay	F. Greenwood, Proserpine
———	..	5	Black ..	M. Ryan, Linville
———	..	6	Brown ..	E. W. Sweeney, Teviotville
———	..	Aged	Brown ..	King Brothers, Wildash, *via* Warwick
Wallace	..	6	Bay	J. Braithwaite, Chinchilla
Wallace	..	Aged	Chestnut ..	G. E. Cox, Proserpine
White Sock ..	..	4	Chestnut ..	J. Waters, Beaudesert
Willangie	..	Aged	Bay	A. Smith, Merinda
Wyllie	..	4	Bay	G. Dale, Rosewood
Young Don Robin	..	Aged	Bay	S. Pidgeon, Hivesville

QUESTIONS SHOW DATES, 1935.

April.

Oakey, 13.
Kingaroy, 11 and 12.
Chinchilla, 16 and 17.
Nanango, 16 and 17.
Miles, 24.
Sydney, 15 to 24 April.
Dirranbandi, 24 and 25.
Rosewood Campdraft, 27.
Taroom Campdraft, 29.

May.

Wallumbilla, 1 and 2.
Taroom, 1 and 2.
Beaudesert, 1 and 2; Campdraft, 3 and 4.
Wondai, 2 and 3.
Goondiwindi, 3 and 4.
Longreach, 6 to 9.
Murgon, 9 to 11.
Blackall, 13 to 15.
Mitchell, 15 and 16.
Mundubbera, 15 and 16.
Goomeri, 15 and 16.
Barcaldine, 21 and 22.
Ipswich, 21 to 24.
Gympie, 22 and 23.
Biggenden, 23 and 24.
Toogoolawah, 24 and 25.
Kalbar, 25.
Maryborough, 28 to 30.

June.

Marburg, 1 to 3.
Wowan, 6 and 7.
Bundaberg, 6 to 8.
Lowood, 7 and 8.
Boonah, 12 and 13.
Esk, 14 and 15.
Warrilview, 15.
Rockhampton, 18 to 22.
Mackay, 25 to 27.
Laidley, 26 and 27.
Proserpine, 28 and 29.

July.

Gatton, 3 and 4.
Bowen, 3 and 4.
Ayr, 5 and 6.
Townsville, 9 to 11.
Cleveland, 12 and 13.
Rosewood, 12 and 13.
Charters Towers, 16 to 18.
Cairns, 23, 24, 25.
Atherton, 30 and 31.

August.

Caboolture, 2 and 3.
Pine Rivers, 9 and 10.
Royal National, 19 to 24.

September

Imbil, 6 and 7.
Tully, 13 and 14.
Innisfail, 20 and 21.
Rocklea, 21.
Kenilworth, 28th.

AGRICULTURE ON THE AIR.

Radio Lectures on Rural Subjects.

Arrangements have been completed with the Australian Broadcasting Commission for the regular delivery of further radio lectures from Station 4QG, Brisbane, by officers of the Department of Agriculture and Stock.

On Tuesday and Thursday of each week, as from the 2nd April, 1935, a fifteen minutes' talk, commencing at 7.15 p.m., will be given on subjects of especial interest to farmers.

Following is the list of lectures for April, May, and June, 1935:—

SCHEDULE OF LECTURES.

BY OFFICERS OF THE DEPARTMENT OF AGRICULTURE AND STOCK, RADIO STATION 4QG, BRISBANE (AUSTRALIAN BROADCASTING COMMISSION).

Tuesday, 16th April, 1935—"Problems in Wheat Breeding," by R. E. Soutter, Wheat Breeder, Roma State Farm.

Thursday, 18th April, 1935—"Maintaining the Standards of Queensland Wheat," by R. E. Soutter, Wheat Breeder, Roma State Farm.

Tuesday, 23rd April, 1935—"Seed Selection," by L. G. Miles, B.Sc., Ph.D., Plant Breeder.

Thursday, 25th April, 1935—"Selecting the Breeders" (Poultry), by J. J. McLachlan, F.B.S.A., Poultry Inspector.

Tuesday, 30th April, 1935—"Soya Beans," by H. Ball, Assistant Experimentalist.

Thursday, 2nd May, 1935—"Economic Methods in the Destruction of Green Timber," by H. Ball, Assistant Experimentalist.

Tuesday, 7th May, 1935—"Agricultural Problems with Special Reference to Soil Erosion," by A. E. Gibson, Director of Agriculture.

Thursday, 9th May, 1935—"Clean Crops and Their Value to the Farmer," by A. E. Gibson, Director of Agriculture.

Tuesday, 14th May, 1935—"The Farmers' S.O.S.—'Save Our Soil,'" by J. F. F. Reid, Editor of Publications.

Thursday, 16th May, 1935—"General Problems in Plant Breeding in Queensland," by L. G. Miles, B.Sc., Ph.D., Plant Breeder.

Tuesday, 21st May, 1935—"Recording Pig Production," by L. A. Downey, H.D.A., Instructor in Pig Raising.

Thursday, 23rd May, 1935—"Housing and Management of Pigs," by L. A. Downey, H.D.A., Instructor in Pig Raising.

Tuesday, 28th May, 1935—"The Prospects of Success with English Type Sheep in Queensland," by J. L. Hodge, Instructor in Sheep and Wool.

Thursday, 30th May, 1935—"Frost Prevention by Orchard Heating," by H. Barnes, Director of Fruit Culture.

Tuesday, 4th June, 1935—"Grading Pig Products," by E. J. Shelton, H.D.A., Senior Instructor in Pig Raising.

Thursday, 6th June, 1935—"Tropical Fodders—No. 1 Grasses," by C. T. White, Government Botanist.

Tuesday, 11th June, 1935—"Tropical Fodders—No. 2 Herbage," by C. T. White, Government Botanist.

Thursday, 13th June, 1935—"Shade Trees," by W. D. Francis, Assistant Botanist.

Tuesday, 18th June, 1935—"Some Native Grasses," by S. L. Everist.

Thursday, 20th June, 1935—"Artificial Incubation," by P. Rumball, Poultry Expert.

Tuesday, 25th June, 1935—"Queensland Nut Growing," by H. Barnes, Director of Fruit Culture.

Thursday, 27th June, 1935—"Citrus Culture," by H. Barnes, Director of Fruit Culture.

Answers to Correspondents.

BOTANY.

Replies selected from the outward mail of the Government Botanist, Mr. Cyril White, F.L.S.

Feather-Top. Rhodes Grass. Stink Grass. Wild Millet.

D. (Dalby)—

1. *Chloris virgata,* Feather-top Rhodes grass. Very common in some parts of Queensland. In the Lockyer district it has invaded the lucerne paddocks and become rather a bad pest, seriously reducing the earning capacity of the fields. Though green and luscious-looking, it is generally rejected by stock, but I have heard they will eat it readily enough when made into hay.
2. *Eragrostis cilianensis,* Stink grass. A very common grass in cultivation in different parts of Queensland, especially abundant on the Darling Downs. Generally speaking, stock do not eat it, at least to any extent.
3. *Echinochloa colona,* Wild Millet. A good fodder and a close ally of such well-known cultivated species as White Panicum and Japanese Millet.

Canada Fleabane.

P.O.T. (Gooroolba)—

Your specimen represents *Erigeron canadensis,* the Canada Fleabane, also known as Horse Weed. The name Fleabane arises from the fact that this plant contains a volatile oil which is used as a deterrent for mosquitoes and other insect pests. The plant is very common in most warm temperate countries and is now very common in Queensland as a weed of cultivation lands, particularly of stubble fields and old cultivation paddocks. Some people when working among the plant find the sap very irritating to the skin.

Hop Bush. Tick Trefoil.

G.P. (Eudlo)—

The shrub is *Dodonæa triquetra,* or Hop Bush. Stock will eat this plant, and it is not known to possess any poisonous or harmful properties. It commonly comes up after a burn, although we have seen it most abundant on second-class country rather than on scrub lands. It is a shrub that lasts for several years, but we think brushing and burning would eradicate it. We have not had much experience with it as a weed, but judging by its manner of growth, we should not say it would be a pest in the same way, say, as Wild Tobacco.

The creeping legume is *Desmodium triflorum,* a species of Tick Trefoil, so called from the fact that the small pods are jointed, each joint containing a single seed. The individual joints attach themselves, by means of small hooked hairs, to clothing, feet of animals, &c., and in this way the plant is spread. It is quite a good fodder, but grows rather close to the ground to give stock, particularly cattle, anything like a decent bite.

The Quandong.

K.I.M. (Eulo)—

Three varieties of quandong are represented in Queensland:—

1. *Elæocarpus grandis,* the blue quandong. Common in the coastal scrubs of Queensland and Northern New South Wales. It has a wide distribution in this State, being found from the Tweed River to the Cairns timber district. It belongs to a totally different family of plants (Elæocaceæ) to the quandongs of the West.
2. *Fusanus acuminatus.* This, we think, is your yellow quandong.
3. *Fusanus persicarius.* This, we think, is your red quandong.

The yellow and red quandong belong to the family Santalaceæ or Sandalwood, and have the peculiar habit of being parasites, their roots lacking root hairs, and obtaining their water requirements and mineral foods in solution by means of small haustoria or suckers which attach themselves to the roots of neighbouring trees. We would be very glad to have specimens of quandongs from your district. A few branches either in flower or fruit would be gratefully received, for the material of these plants in our herbarium is very limited, particularly from Queensland.

Blood Vine.

E.S.D. (Mackay)—

It is very difficult to name specimens of plants from leaves only. That you sent, we should say, represented the Blood Vine, *Lonchocarpus Blackii*, a vine fairly common in many of the scrubs of coastal Queensland, and bearing large trusses of reddish flowers. It is highly ornamental, and is probably best propagated from seed. Some of these leguminous vines strike from cuttings, and if you care to try them you should take portions of the stem about the thickness of a pencil, or, say, a little thicker, consisting of a few joints, and place about 6 to 8 inches in fairly moist sandy soil or gravel.

Leichhardt Bean as Poultry Food.

M.F.S. (Clermont)—

We have no record of your local Leichhardt Bean or Horse Bean (*Cassia Brewsteri*) being used as food for poultry or stock. Several other members of the genus, however, are used in this way, and are said to make a good feed. We think they would be more suitable for poultry than for larger stock, and before using them on any large scale we would feel inclined to soften or boil them, and use discreetly in the first place.

Mistletoe. Red Bottle Brush. Corkwood.

P.D. (Murgon)—

1. The larger specimen, *Loranthus grandibracteus*, a species of Mistletoe, a parasite on different native trees.
2. The smaller specimen, no flowers or fruit, but I should say *Callistomen viminalis*, the Red Bottle Brush, or an allied species.

Neither of these plants is known to possess any poisonous or harmful properties.

The tree common in your district belonging to the *Solinaceæ* is *Duboisia Leichhardtii*, commonly known as Corkwood. The leaves of this are very poisonous, and, like other members of the family, contain a mixture of alkaloids.

Wild Sunflower.

S.S.B. (Roma)—

Your specimen has been determined as *Verbesina encelioides*, a native of America, now a very common naturalised weed in many parts of Queensland and New South Wales. It is most generally known as Wild Sunflower. Dr. Seddon, Director of the Veterinary Research Station, Glenfield, N.S.W., has recorded this plant as the cause of pneumonia in sheep in New South Wales. In conversation with Dr. Seddon on the matter he informed us that this particular case was one where sheep had been feeding on old cultivation paddocks where there was a predominance of this weed. So far as we know no trouble has been experienced with it in Queensland, and on the whole stock seem to leave it alone when other feed is available.

Roley-Poley. Purple Top. A Native Legume.

H.H.F. (Bowenville)—

1. *Bassia quinquecuspis*, Prickly Roley-Poley, sometimes called Bindy-eye, a name, however, applied to a large number of burr plants in Western Queensland and which, strictly speaking, we think, should be applied only to species of the genus Calotis. The genus Bassia is a large one well developed in Australia. It contains the Galvanised Burr and a number of woody plants. They are allied to the saltbushes and most of them are eaten by stock in their young stages, but soon become woody and unpalatable.
2. *Verbena bonariensis*, Purple-top. A native of South America, now a common naturalised weed over most warm temperate countries.
3. *Vigna lanceolata*, a native legume fairly common in parts of the Western Darling Downs and Maranoa districts. It is said to make quite good fodder. It often has the peculiar habit, particularly in cultivated ground, of ripening pods underground somewhat after the type of the ordinary peanut. In this case, however, ordinary pods are borne above the ground. The subterranean pods are very different to the ordinary ones, being more globose.

Poisonous Plants Harmful to Man.

H.F. (Cairns)—

The literature regarding plants poisonous or harmful to human beings is very scattered in Australia. Regarding particular kinds that grow in North Queensland, the following remarks apply:—

Tegnephora Moorei, a plant of the Moon Seed family, *Menispermaceæ*, sometimes called Native Grapes, owing to the similarity of the fruits to those of a Vitis. The late Dr. T. L. Bancroft found the root bark to contain an active poisonous principle (probably an alkaloid) and this probably extends throughout the whole plant. A brief reference to children being made ill by it will be found in the "Queensland Agricultural Journal," April, 1918, p. 147.

Vitis spp.—Some of the native species of Vitis contain needles of calcium oxalate, and both fruits and the fungus themselves have caused severe irritation in the mouths of people who have accidentally eaten them.

Blepharocarya involucrigera, the North Queensland Bollygum or Rose Butternut. You will find a reference to the effects on timber workers of this wood in "Timbers and Forest Products of Queensland," by E. H. F. Swain, p. 128. A note is made to the effect that it is possible that the affection may have been provoked by vegetable spores and insect matter associated with the wood, but we do not think there is anything in this contention, as members of the family *Anacardiaceæ* are notorious for the possession of this quality. The tree has been put by some botanists in *Sapindaceæ*, and by others in *Anacardiaceæ*. The possession of a blistering sap would seem to indicate that *Anacardiaceæ* is the correct family.

Semecarpus australiensis. This is the well-knokn Tar Tree of North Queensland. It is likewise a member of the *Anacardiaceæ*, and its effects on people are probably well known to you.

Mangifera indica, the common Mango. The effects of the Mango, particularly of the fruit rind, are probably well known to you. It belongs to the same family as the last two trees.

The well-known Poison Ivy of North America, sometimes cultivated in the Southern States and in Southern Queensland as a garden creeper, belongs to the same family.

Rhodomyrtus macrocarpa. This is the well-known Finger Cherry of North Queensland. The fruit when eaten in any quantity at times causes permanent blindness in people, destroying, we understand, the optic nerve. Its effects are probably well known to you. The fruit has not been the subject of any intensive scientific investigation, although the subject warrants it. H. Tryon, late Government Vegetable Pathologist, has recorded in Government reports and in the North Queensland press that the fruit contains a saponin, and the dreaded qualities of the fruit are due to this body. The late F. M. Bailey, for many years Government Botanist, stated his impression that the fruit was only poisonous when invested by a particular fungus, *Gloeosporium periculosum*. In the former case the fruit would be most harmful when immature, the latter when overripe.

Bryonia laciniosa. A reference to children being poisoned by this vine will be found in the "Queensland Agricultural Journal" for December, 1924, pages 442 to 444.

Solanum seaforthianum, a very common climber, a native of tropical America, often grown in gardens on account of its ornamental flowers and fruit; has now run out in many areas, including the Atherton Tableland, and become more or less a pest. A reference to children being made violently ill through eating the berries will be found in the "Queensland Agricultural Journal," Volume 19, p. 238.

Datura. Several species of datura are common on cultivation and as weeds in North Queensland, including the common stramonium, and one is very abundant on the black soil plains of the Northern interior. We have not heard of any actual cases of human beings being poisoned by the plant.

Duboisia myoporoides, Corkwood. This native tree comes up very freely as a secondary growth in paddocks in parts of the Atherton Tableland and other places in North Queensland. No actual cases of poisoning of children by eating the leaves has come under our notice in Queensland, but there are several records in New South Wales.

Wikstroemia indica. A couple of years ago, fruits of this were recorded as causing the death of a child at Nambour, North Coast Line, and feeding experiments conducted at the Animal Health Station, Yeerongpilly, on guinea pigs, definitely proved them to be very poisonous. The results of this experiment have not so far been published.

Excœcaria agallocha. The late F. M. Bailey has recorded in one of his writings the fact that a child was made violently ill by chewing the sap of this tree, commonly called the Milky Mangrove, in mistake for Fig Tree sap. The blistering effect of the sap of this species and others is well known. These saps cause intense irritation and pain, and if they accidentally get into the eye cause temporary blindness.

Alocasia macrorrhiza, the common Cunjevoi, contains needles of calcium oxalate. Leaves have been accidentally chewed by children, causing intense swelling and irritation in the tender parts of the mouth. This is a feature common to practically all members of the family Araceæ-Taro, Dasheen, Elephant's Ear, &c.

Chrysopogon aciculatus, a common grass seed, or Mackie's Pest of North Queensland. The seeds are provided with an awn which produces irritating sores. Reference to it will be found in the "Queensland Agricultural Journal" for May, 1917.

The foregoing is just a brief sketch of some of the plants known to be poisonous or injurious to human beings in North Queensland. We presume you have seen the article by Dr. J. B. Cleland in the "Journal of Australia," for 10th October, 1925, in which there is a general account of plants poisonous or otherwise injurious to man in Australia, with a fairly big bibliography at the end.

Mint Weed.

S.C. (Boonah)—

Your specimen represents *Salvia reflexa,* the Mint Weed, a native of North America, which has become naturalised in several places on the Darling Downs, and one or two other localities in Queensland. It seems to have first made its appearance in the neighbourhood of Pittsworth, and for some years was confined to that area. It attracted some considerable notice a few years ago as causing deaths among travelling stock. Ordinary paddock stock, such as grazing stock, seem to be unaffected, or almost unaffected, by the plant.

Grasses and Clovers.

J.C.G. (Brisbane)—

1. The specimen of grass forwarded is not Molasses Grass but the Para Grass (*Brachiaria mutica*), better known in Queensland as *Panicum muticum,* also sometimes as Giant Couch. It is a far superior grass, we think, to Molasses grass, and is one of the best grasses for heavy stocking. It does particularly well on the North Coast Line in cultivation and in damp situations. Stock are exceedingly fond of it, but it is very frost-tender. It is, however, always worth having a small paddock of it for grazing off or cutting periodically.

2. *Poa aquatica* has not been grown in Queensland to any extent. We have heard of it doing in one or two cold localities, but on the whole it is not worth worrying about. For similar situations the Para Grass is eminently superior.

3. Regarding winter fodders, the following are a few suggestions:—

Phalaris tuberosa—one of the best.

Dactylis glomerata, Cocksfoot. We have heard of this doing exceedingly well in different parts of the North Coast Line. It is worth a trial.

Clovers.—The common White Dutch is the best to grow. This spreads into the ordinary pasture and is exceedingly common on the North Coast Line. Red clover does quite well in cultivation but, as far as Queensland is concerned, is more a clover for growing on small areas for grazing or cutting rather than sowing in the ordinary pasture.

Lotus major would probably do quite well. It has one great drawback, and that is, that it contains a prussic acid-yielding glucoside.

Strawberry Clover is worth trying, but probably would not succeed other than in wet situations.

Three Leguminous Plants. Peach-leaf Poison Bush.

C.F.F. (Calen, N.Q.).—The three specimens of leguminous plants have been determined as follows:—

1. The lucerne-like plant with the small leaf is *Indigofera trifoliata*. We have not heard a common name applied to this, but it is fairly common in North Queensland and is looked on as a valuable fodder. It is also common in India and in that country, likewise has quite a reputation as a fodder for stock.
2. The plant with a medium-sized leaf is *Pycnospora hedysaroides*, a very common plant in much of the native pasture of North Queensland. We have not many records of it as a fodder, but it is probably quite a useful plant in the mixed pasture.
3. The plant with a large leaf is *Uraria lagopodioides*. The same remarks apply as to No. 2.

All three plants are legumes, should be quite nutritious, and we do not think any of them would bloat stock.

Regarding the Peach-leaf Poison-bush, the bright-leaved one is *Trema aspera* var. *viridis*, and the soft-leaved one is *Trema orientalis*. Both are slightly different to the common Poison-bush of Northern New South Wales and Southern Queensland. The properties are probably much the same, although the one with the green leaf is generally looked on in North Queensland as the more virulent of the two. In spite of the fact that these plants have a very bad reputation as poisonous plants, stock frequently browse on them with impunity.

Mr. K. S. McIntosh, Veterinary Officer, Animal Health Station, Yeerongpilly, recommends the following treatment of affected animals:—

Treatment.—If peach poisoning is common on the property it would be economical to keep a few bottles of the following antidote on hand and administer *as soon as the symptoms are noticed.*

Bottle No. 1.

Perchloride of iron	3 ounces
Water	8 ounces

Bottle No. 2.

Calcined magnesia	1½ ounces
Water	8 ounces

Add No. 1 to a pint of water, add contents of No. 2 and stir. Administer the whole quantity.

Also inject ½ to 1½ oz. of sulphuric æther under the skin with a hypodermic syringe.

The animals should immediately be removed from access to the plant. If practicable, eradication of the plant is the best method of preventing the trouble.

Mat Grass.

J.R.W. (Millaa Millaa)—

The specimen represents *Axonopus compressus*, the narrow-leaved carpet grass or mat grass. This grass was boomed as a fodder some years ago, and has some very definite value for second-class country. The only trouble found with it in parts of Queensland is that it invades the paspalum pasture; and if it gets a good hold may ruin the pasture in much the same way as sour grass or yellow grass, which is common in some of the wetter parts of the Atherton Tableland.

Boonaree.

W.Q. (Baking Board)—

Your specimen represents *Heterodendron oleæfolium*, commonly known in parts of Western Queensland as boonaree. Western rosewood is another name often applied to it. It is a shapely tree eaten readily by stock. The leaves, however, contain a prussic acid yielding glucoside, and if hungry stock are allowed to gorge themselves on it trouble may ensue. It is very rarely that any losses are experienced with thet plant in Queensland, but a year or two ago there was a rather serious one in the Roma district, when hungry sheep had been allowed to gorge themselves on the leaves of this tree freshly felled and then went straight away and had a drink of water.

Grasses and Plants Identified.

A.H.H. (Chinchilla)—

1. *Panicum uncinulatum.* A very wiry Panic grass generally found growing on the edge of scrubs. It is very common in some brigalow areas, and, in spite of its wiry nature, seems to be very freely eaten by stock, and on the Western Downs and Maranoa has rather a high reputation as a fodder.
2. *Panicum buncei,* a native Panic grass. Most of the native Panic grasses are generally regarded as quite good fodder.
3. *Sporobolus pallidus,* Fairy grass.
4. *Panicum subxerophilum.* A very common grass in parts of the Western Darling Downs and Maranoa districts. It is often seen growing in billabongs. In spite of its wiry nature stock seem to eat it readily enough, particularly towards the end of the season.
5. *Leptochloa decipiens* var.
6. *Eragrostis cilianensis,* Stink grass. An imported grass usually only seen as a weed of cultivation. Generally speaking, stock do not take to it and it has little value as a fodder.
7. *Diplachne Muelleri.*
8. *Eriochloa* sp., Early Spring grass. All the *Eriochloa* grasses have good reputations as fodders.
9. *Bothriochloa decipiens,* Bitter Blue grass, Red Leg, or Pitted Blue grass. Not regarded as of much fodder value.
10. *Echinochloa colona,* Barnyard Millet. A useful fodder grass closely related to such well-known cultivated fodders as Japanese Millet and White Panicum.
11. *Cassia Sophera* var. *schinifolia.* A very common bush in parts of Western Queensland. It has been reported poisonous to stock, but feeding experiments with allied species of *Cassia* in Queensland have shown them to have purgative properties but not to be otherwise harmful. It belongs to the same family as the senna of commerce.
12. *Commelina cyanea.* Sometimes called Scurvy grass.
13. *Boerhaavia diffusa,* Tar Vine. Generally regarded as a useful fodder plant.

Milky Cotton Bush.

J. McD. (Cawarral)—

Your specimen represents the Milky Cotton Bush (*Asclepias curassavica*), a plant belonging to a dangerous family, the *Asclepiadiaceæ*. In conversation with Dr. Seddon, of the Glenfield Research Station, he informed us that feeding tests carried out in New South Wales with this plant have definitely proved it to be poisonous. We have not yet had many cases of poisoning by it in Queensland, and the only ones that have come under our notice have been where calves have eaten the plant in some little quantity. Generally speaking, ordinary stock seem to avoid the plant, or at least not eat it in sufficient quantity to cause trouble.

White Crepe Myrtle. Chalta Tree.

T.L.B. (Caboolture)—

The specimen represents *Lagerstroemia indica* var. *alba,* the White Crepe Myrtle.

The leaf from the tree at Dunwich represents *Dillenia indica,* the Chalta Tree, a native of India. The fruit is there said to be used in curries, also in the making of jellies. Although we have seen several trees in different parts of Queensland we have not known anybody here use the fruit in any way. It is quite a handsome tree and well worth growing for its ornamental foliage and large white flowers.

Water Hyacinth.

W.R.B. (Toogoolawah)—

Water hyacinth is a pest if it gets into running creeks. In dams and tanks, particularly away from streams, it can generally be kept in check. Probably the seeds were carried into your dam on the feet of water fowl. Stock eat the plant quite readily. It does not injure the water in any way. We would recommend that you get rid of it on account of the danger of its spreading into nearby creeks and rivers.

General Notes.

Staff Changes and Appointments.

Mr. J. Northcott, Caretaker of the Stuart River Dip, via Tingoora, has been appointed an Honorary Inspector of Stock.

Mr. S. C. O. Jessop, Inspector of Stock, Toowoomba, has been appointed also an Inspector under the Brands Acts.

Mr. G. F. Young, Inspector of Stock at Crow's Nest, has been appointed also an Inspector under the Brands Acts.

The following transfers of officers in the Department of Agriculture and Stock have been approved:—

Mr. C. Schindler, Inspector under the Diseases in Plants Acts, from Stanthorpe to Tallebudgera;

Mr. G. W. J. Agnew, Banana Agent, from Tallebudgera to Nambour; and

Mr. R. L. Prest, Instructor in Fruit Culture, from Nambour to Brisbane.

Messrs. J. R. D. Munro, F. C. Coleman, J. Davies, J. Cattanach, and P. A. Kelly, Inspectors of Dairies at Clifton, Pittsworth, Chinchilla, Esk, and Oakey, respectively, have been appointed also Inspectors under the Slaughtering Act; Mr. C. P. Joyner, Inspector of Stock at Cooyar, has been appointed also an Inspector under the Slaughtering and Dairy Produce Acts; and Messrs. J. W. Mackay and S. E. Fogg, Dairy Inspectors at Wowan and Malanda, respectively, have been appointed also Inspectors under the Slaughtering and Diseases in Stock Acts.

Mr. H. G. Noble, Gradule, has been appointed an Honorary Inspector of Stock.

Mr. R. Moore, of Bardon Estate, Bardon, who acts as Ranger for the Brisbane City Council, has been appointed also an Honorary Ranger under the Animals and Birds Acts and the Native Plants Protection Act.

Mr. S. Edwards, Lake Pleasant, Goovigen, has been appointed an Honorary Ranger under the Animals and Birds Acts.

Mr. T. K. Kelly, Field Assistant at the State Farm, Roma, has been appointed an Inspector under the Diseases in Stock Acts, the Slaughtering Act, and the Dairy Produce Acts.

Acting Sergeant F. H. Bate, Nebo, has been appointed also an Inspector under the Brands Acts.

Citrus Levy.

A regulation has been approved, under the Fruit Marketing Organisation Acts, extending for a further twelve months from 1st March, 1935, the Citrus Levy which was approved in March, 1934. A slight alteration is made this year, it being provided that no levy shall be imposed on single case consignments which form part of a consignment with other fruits. It is maintained that single cases by rail are mostly growers' direct country order trade which should be encouraged.

Butter and Cheese Boards.

Notice of intention to extend the operations of the Butter and Cheese Board for the period from the 8th February, 1935, to the 30th June, 1935, was published in the "Government Gazette" on the 19th January last, and petitions on the question of the continuance or otherwise of these boards, to be lodged by the 18th February, were invited from growers. No petitions were received, and Executive approval has accordingly been given to-day to the issue of Orders in Council extending the term of both boards until 30th June next, and providing that the present members of each board shall continue to hold office until such date.

The present members of the Butter Board are—Messrs. J. Purcell (Toowoomba) (Chairman), W. J. Sloan (Malanda), R. H. Hill (Bororen), J. McRobert (Maryborough), T. F. Plunkett (Beaudesert), A. G. Muller (Fassifern Valley, Kalbar), and E. Graham, Director of Marketing).

Members of the Cheese Board comprise—Messrs. H. T. Anderson (Biddeston) (Chairman), T. Dare (Narko), A. J. Harvey (Pittsworth), D. G. O'Shea (Southbrook), A. Pearce (Coulstoun Lakes), and E. Graham, Director of Marketing).

Isis District Cane Growers' Executive.

An Order in Council has been issued amending the Primary Producers' Organisation and Marketing Acts by inserting a provision creating the Isis District Cane Growers' Executive. Representations have been made by the Isis Mill Suppliers' Committee and others for the creation of a separate Executive for the Isis canegrowers, and action has now been taken to provide that the Isis Mill Suppliers' Committee shall constitute the Isis District Cane Growers' Executive.

A Goondiwindi Sanctuary.

"Kildonan," the property of Mr. Walter Gunn, at Goondiwindi, has been declared a sanctuary for the protection of animals and birds, and Mr. Gunn has been appointed an Honorary Ranger under the Animals and Birds Acts in respect of the sanctuary.

Tubercle-free Herds.

The following herds have been declared free from tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle free:—

Owner and Address.	Number tested.
D. R. Hutton, Cunningham	42
Paterson and Paterson, Croxley, Oakey	95
R. A. Slaughter, Clifton	16
Grimmett and Sons, Sherwood	61
F. P. Allan, Stoneleigh Dairy, Oxley	63
H. H. Dight, Warwick	37
E. H. Heale, Riverdale, Kureen	34
Clayton Brothers, Tinana	95

Abortion-free Herds.

The following herds have been declared free of contagious abortion (Bang's disease) in accordance with the requirements of the scheme of certifying herds abortion free:—

Owner and Address.	Number in herd.
Clayton Brothers, Tinana	95
Grimmett and Sons, Sherwood	61
F. P. Allan, Stoneleigh Dairy, Oxley	63
H. H. Dight, Warwick	37

Newspapers—Insufficient Postage.

Considerable trouble is experienced by the Postmaster-General's Department in connection with newspapers posted by the public bearing insufficient postage, and records show that in Brisbane alone 661 newspapers with insufficient postage were posted during a period of two weeks. On these figures it can well be imagined the large number of such articles which must be posted throughout the Commonwealth during each year.

Insufficiently prepaid newspapers to addressees in Australia are taxed double the deficient postage and sent on, whilst those for persons beyond the Commonwealth are forwarded to the Dead Letter Office. Obviously much disappointment would be felt by overseas addressees in not receiving papers posted to them, whilst those people from whom taxes were demanded before delivery of their papers would also feel aggrieved.

In the circumstances it would be advantageous, both in your own and your patrons' interests, if you were to print on the front page of your publication (especially issues of more than normal weight), the postage charges applicable to copies posted for delivery in Australia and in the principal countries of the world where purchasers are likely to send copies to their friends.

The following are the rates of postage on newspapers posted to:—

Addresses within the Commonwealth, New Zealand, and the islands annexed thereto, also Fiji	1d. per 6 oz.
United Kingdom and Irish Free State, via France or America	1d. per 4 oz.
Via All Sea route	1d. per 6 oz.
Other places in the British Empire	1d. per 4 oz.
Foreign places	1d. per 2 oz.

Plywood and Veneer Board Levy.

Regulations empowering the Plywood and Veneer Board to make a levy of 3d. per 100 feet face measurement on deliveries of pine plywood were issued on 5th January last. The proceeds from the levy were to be used to establish a fund for the purpose of subsidising growers for plywood despatched outside the Commonwealth. Approval has now been given to an amendment of the abovementioned regulations to provide that all deliveries under the base price of 14s. per 100 feet for three-sixteenths inch sanded one side, first-class pine plywood shall be exempt from the levy.

Sugar Experiment Stations Advisory Board.

Executive approval has been given, in pursuance of the provisions of "*The Sugar Experiment Stations Acts Amendment Act of* 1934," to the appointment of the following as members of the Sugar Experiment Stations Advisory Board:—

Hon. F. W. Bulcock (Chairman),

Dr. H. W. Kerr (Director of Sugar Experiment Stations),

Messrs. W. D. Davies and B. Courtice, of Innisfail and Bundaberg, respectively, representing the sugar-cane growers; and

Messrs. John Smith (General Manager of Farleigh Co-operative Sugar Milling Association, Limited) and W. F. Seymour-Howe (General Manager of the Mulgrave Central Sugar Mill), representing the manufacturers of cane sugar.

Arsenic in Wool Inquiry.

Executive approval has been given, in pursuance of the provisions of "*The Official Inquiries Evidence Acts,* 1910 *to* 1929," to the appointment of a committee consisting of Dr. J. Grahame Drew, of the Department of Public Health; Mr. J. Carew, Senior Instructor in Sheep and Wool, Department of Agriculture and Stock; and Mr. O. J. Kelly (representing the A.W.U.), to investigate the effects of arsenic on persons engaged in the pastoral industry as a result of the use of arsenical preparations for the jetting or dipping of sheep for blowfly. Mr. A. C. Boyle, of the Department of Agriculture and Stock, has been appointed Secretary to the Committee.

Mysterious Poultry Disease.

Mr. G. C. McLennan, Veterinary Pathologist of South Australia, in a paper presented to the meeting of the Australian Veterinary Association, and considered at the Science Congress in Melbourne, dealt with a comparatively new disease in poultry as far as Australia is concerned. Fowl paralysis (*Neurolymphomatosis gallinarum*) was first described by Marek from Austria in 1907. From then until 1921, when the condition was reported by Kaupp in the United States of America, apparently nothing concerning the disease appeared in the literature. Up to the present, and particularly since 1926, much research work had been carried out. The disease has been reported as occurring in England, America, Germany, Austria, Holland, Japan, and Australia. The usual age at which birds begin to show symptoms in South Australia was about three months, but cases had been observed at eight weeks, and five to six months. Both sexes, and apparently any breed, were susceptible. A feature of the first occurrence in South Australia was the explosive nature of the outbreak. It appeared quite suddenly, and affected approximately 10 per cent. of the flock, and as far as could be ascertained had not reappeared in three years. The incidence in Australia did not appear to be high. The symptoms appeared quite suddenly, and were characterised by a paralysis of the legs, which varied in degree. Gasping was common, and in active cases the appetite was affected. Neither wing paralysis nor iritis had been observed. Ruffling of the feathers of the head was common. The duration varied—some cases went on to death in ten days; others survived for three months, eventually dying from emaciation and exhaustion. The pathological findings by the writer of the paper differed somewhat from those recorded by other observers. Many theories had been advanced to explain the ætiology of fowl paralysis, but most workers were of opinion that the condition was of the nature of an infection, although there were some who considered that the cause lay in some nutritional factor. No micro-organism had been seen or cultured, and the experimental proof that the ætiological agent was a virus was not convincing. His (Mr. McLennan's) experiments designed to test the virus theory were, with the exception of one, entirely negative. The result of the one experiment in which positive results were obtained could be explained by the interference with the egg necessitated by the technique.

Rural Topics.

Poisoning Green Timber.

"Frilling" and poisoning with an arsenic solution has been found an effective way of rapidly killing green timber, though the usual drying out must, of course, take place before the dead tree can be burnt. If the operation is carried out when the sap is just completing its downward course, states a departmental leaflet, suckering is largely prevented.

A useful formula for quick and effective work in all kinds of timber is arsenic 1 lb., washing soda 1 lb., or caustic soda ½ lb., water 3 gallons. Arsenic—the ordinary white arsenious oxide of commerce—is not soluble in water to any great extent, so that soda, either the ordinary washing soda or caustic soda, has to be used to dissolve it. When large amounts of the solution are required, washing soda will be the cheaper, but for small quantities of solution caustic soda will possibly be found the handiest.

When preparing the solution, whether caustic soda or washing soda is used, first dissolve the soda in a convenient amount of water, using heat, if desirable, to hasten the process; then slowly add the arsenic, which has been previously made into a thin paste, stirring all the time; place on a strong fire, and after it has come to the boil, allow it to remain boiling for at least half an hour; stir from time to time, and be careful to stand on the side away from the fumes, as they are poisonous and are apt to cause sickness. When the arsenic is thoroughly dissolved, the solution may be made up to the required bulk by adding the remainder of the water, either hot or cold.

Frilling the tree consists of a succession of downward axe cuts completely round the trunk, each cut well overlapping the adjoining ones, so as to leave no unsevered section of bark up which the sap can flow. The cuts must be through the bark and well into the wood proper, and as close down to the ground-level as it is convenient to cut them consistent with the shape of the trees, say, from 6 to 10 inches up. For trees of 4 feet in diameter pour about a quart of solution into this frilling right round the tree, using an old teapot or kettle, as the spout makes pouring easy, and less is wasted in spilling. Smaller trees naturally need less solution. Saplings may be cut off low down and the solution dabbed on with a swab-stick to kill and prevent suckering.

It is very important that the frilling and the application of the poison be consistently and thoroughly carried out and not in any way scamped or slummed if good results are to be looked for.

There need be no fear of stock being poisoned by eating the fallen or dead leaves from poisoned trees, for with the comparatively small quantity of solution used the likelihood of leaves absorbing any free arsenic is very remote, but there is some danger to stock grazing on areas frilled and poisoned, and it is desirable to keep all stock off for three or four weeks, when all possible chance of danger will have disappeared.

Arsenic pentoxide, as used by the Prickly-pear Board, may be substituted for the arsenic and soda. It is soluble in water, but as it has a corrosive action wooden or earthenware containers will be required.

Cleaner Milk—Points in Dairy Practice.

The party of New South Wales farmers who toured New Zealand last year observed many useful points in practice on Dominion dairy farms. In the South Island, particularly, the water supply is nothing like the problem it is in parts of Australia, and on those dairy farms where a reticulated water system is possible the following point will have a definite interest:—Where practicable, it is usual to have a car sponge attached to a hose and water supply for washing the cows' udders. This idea enables the udders to be cleansed with running water, thus replacing the usual teat rags, so often a fertile source of harmful bacetria. The use of these teat-washing sponges is claimed to have appreciably lowered the bacterial count of the milk.

Another idea adopted in some dairies in New Zealand is the use of chains in the place of the usual leg ropes. These are considered much more hygienic than the much-stained ropes that are a feature of almost every dairy in the Dominion.

Whitewash.

The method for making what in the United States is commonly known as "Government" Whitewash for both indoor and outdoor work is as follows:—Take 35 lb. to 40 lb. of high quality quicklime, slake with warm water, covering it during the process to retain the steam; strain the liquid through a fine sieve or strainer; add a peck (14 lb.) of salt, previously well dissolved in warm water, 3 lb. of ground rice boiled to a thin paste and stirred in boiling hot, ½ lb. of powdered Spanish whiting, and 1 lb. of glue which has been previously dissolved over a slow fire. Add 5 gallons of hot water to the mixture, stir well and let it stand for a few days protected from dirt. It should be put on hot. One pint of the mixture, properly applied, will cover 1 square yard. Small brushes are the best. There is nothing to compare with it for outside or inside work, and it retains its brilliancy for many years.

Improved Pastures Demand Improved Management.

In the August number of the Journal of the Council for Scientific and Industrial Research, I. Clunies Ross, D.V.Sc., gives a review of the evidence collected in connection with the various pasture factors which influence the degree of parasitism in sheep. In recent years it has been recognised that the extent of parasitic infestation of stomach and intestinal worms in sheep can, in some measure, be controlled by the system and type of feeding practised. Investigations have been made in Australia to determine the effects of improved pastures in (*a*) increasing the degree of parasitism owing to the heavier stocking, or (*b*) so improving the nutritional state of the sheep that they were able to resist infestation, or at least the effects of infestation. It was found on improved pastures carrying three sheep per acre when rotation was practised, and two and a-half sheep without rotation, that there was a greatly increased wool production per sheep when compared with similar animals grazed at the rate of one sheep per acre on natural pasture. In addition, it was assumed that, under the conditions existing in the experiments, the improved nutrition of the sheep more than compensated for any increased risk of parasitism which might have eventuated as a result of the heavier stocking.

However, it must not be assumed from these conclusions that the establishment of improved pastures and the resulting heavier stocking will eliminate internal parasites as a serious stock complaint. The importance of internal parasites on such pastures is dependent on several factors, of which the chief are: the composition of the pasture, the quantity of feed available for the sheep, the duration and heaviness of stocking, and the soil and seasonal conditions in so far as they may increase or decrease the chances of infection.

Influence of Overstocking.—Overstocking is likely to occur on improved as well as on natural pastures. In both cases it will result in lowering the nutritional plane of the sheep, so reducing their resistance to worm infestation. In addition, it would be favourable to the development of the vast numbers of worm eggs and larva voided by the large number of stock. With many stock on a small area the risk of severe infestation consequently becomes very high.

Cases have been reported where graziers have crowded sheep badly infested with small intestinal worms on small areas of good feed for a few days in the hope that the better feed will help the stock over the trouble. Should the weather at the time be favourable to the development of the vast numbers of worm eggs expelled by the stock, there is a big risk of a very much heavier infestation of the sheep taking place. The risk is much greater when the days are showery and mild than when the weather is dry or temperatures are low, for under these latter conditions the eggs are much longer reaching a stage in which they can infect the stock.

Composition of Pasture.—Pastures vary greatly in their composition, and some are particularly poorly balanced in regard to the proportion of clovers and grasses they contain. On such pastures the losing of condition by stock may occasionally occur, and the farmer is sometimes prone to blame worms when he should really attribute the loss in condition to the failure of the pasture to provide the balanced diet required.

In concluding, Dr. Ross states: "Notwithstanding the foregoing discussion of some of the factors which tend to offset the benefit of improved pastures, there is no doubt that the overwhelming body of evidence available indicates that the artificial improvement of pastures by topdressing and the introduction of clovers and improved grasses constitutes a very vital factor in controlling the effects of parasitism and in increasing production." But pastoralists must realise that with such pastures much more attention must be paid to every aspect of pasture and stock management. The methods employed on natural pasture are not suited to improved pastures, and if they are used on these latter considerable loss may be expected both in the health of the stock and in the production of the land. Improved pastures demand improved management.

For Improvement of Orchard Soil.

Every opportunity should be taken of applying to orchard soils bulky organic matter such as bush rakings and the first cuts from lucerne which will rot down and add to the amount of humus. It should be remembered that the nitrifying bacteria which are necessary to convert such vegetable matter into humus require nitrogen and thus use and temporarily lock up the available nitrogen in the soil. Hence it is preferable to apply bulky organic matter during the winter, when this locking up of available nitrogen will prevent its loss by seepage; moreover, it will give time for the process to complete and the nitrogen to be available again to the trees when they awake into activity in the spring.

Where bulky organic matter such as bush rakings, which contains only comparatively little nitrogen, is applied it is an advantage to give a dressing of sulphate of ammonia and carbonate of lime, allowing about ½ cwt. of the former and ¾ cwt. of the latter per ton of rakings. When estimating the weight of bush rakings the weight of the leaf only should be calculated, not of any soil or stones that have been collected with the rakings.—A. and P. Notes, N.S.W. Dept. Agric.

Stands for Cream Cans.

Cream-grading at factories by dairy officers has shown that in far too many cases cream which would otherwise have been graded choicest has had to be placed in an inferior grade through being exposed to the rays of the sun whilst waiting to be picked up by the factory lorry, and has indicated the necessity of cream stands being erected by all suppliers who leave their cream at the roadside to be picked up by the carter.

Dairymen should be sufficiently alive to their own interests to erect some protection for their cream from the direct rays of the sun whilst it is awaiting transport, particularly at times such as these when prices for butterfat are at such a low level. This does not appear to be the case, for a journey along many country roads will show that in many instances cream cans are stood at the roadside quite unprotected. During period of high prices, a half-penny or even a penny per lb. from their cream cheque may not have appeared serious to many dairy farmers, but with the values ruling at present no farmer can afford to run any risk of deterioration of his product which will entail his receiving less than the highest possible price, particularly when the trouble may be obviated practically without cost.

Any deterioration in quality of cream is primarily a loss to the individual supplier, but it also reflects on the prosperity of other suppliers and on the State as a whole. There can be no doubt but that the large percentage of inferior butter contained in our export pack has a very definite bearing on the price which we receive for our choicest butter, and any factor which may influence ruling market rates for our butter is definitely the concern of the State.

A cream stand is not an expensive item and can usually be constructed from material available on the farm, and the only expense will be the small amount of labour involved. No definite type or size of stand is prescribed, and it is left solely to the supplier himself to determine how simple or how elaborate a stand he constructs. The stand should be sufficiently high to raise the cream can two feet or more above ground level, and it should be so constructed that the sun cannot shine directly on to the cream can. The type of stand recommended is one which has a floor at least two feet about ground level, the floor being constructed of narrow slats with a gap between each slat. The back and sides should be louvred to permit free circulation of air, which will tend to keep the cream cool. The top should be watertight and should have a sufficient slope to turn off all rain.—"Tasmanian Journal of Agriculture."

A Remarkable Litter.

A litter of Large White pigs owned by Messrs. Hibberd Bros., Grenier Park Stud, Gold Creek, Indooroopilly, was officially weighed on the 16th March, when they were eight weeks old. The litter consisted of eight pigs, the individual weights of which when fifty-six days old were:—

Sex:	Boar	Boar	Boar	Sow	Sow	Sow	Sow	Sow
lb.:	55	43	43	48	46	48	46	55

Average weight, 48 lb.

While these results are not claimed as a new record they are considered to be well above the average. The dam of the litter is "Highfields Pearl 11th," and the sire "Norfolk Baron 2nd."

Handle Poisons Carefully.

The casual handling of poisons is again illustrated by the District Veterinary Officer (North) in his monthly report, observes the Chief Veterinary Surgeon of the New South Wales Department of Agriculture. The report points out that three calves died in a northern district from eating rabbit poison. In the calf paddock was found an old kerosene tin containing eight leaking tins of this poison, and it was evident that the calves had partaken of it. In a coastal district a stockowner carelessly used an arsenical preparation on his banana plantations, to which he allowed cattle to have access, and as a result two cows died. It is astonishing that there is not more human mortality as a result of the way in which such preparations are treated.

Feed for Fat Lambs.

If the producer is to be able to supply the type of lamb demanded by the export market there must be no shortage of good feed throughout the animal's growth. This involves supplementing the pasture with such crops (according to the district) as oats, skinless barley, rape, turnips, and lucerne. In every case autumn is the time for sowing, and it is in autumn, too, that sowings of grasses and clovers for pasture improvement should be made.

Trusting to natural pastures is extremely risky—very rarely will prime lambs be produced off such feed—but by means of top-dressing and the sowing of better grasses and clovers a large proportion of our pastures are capable of being enormously improved. Pasture so improved, in combination where necessary with lucerne and other fodders, will enable that standard of feeding necessary for the production of high quality carcases.

The importance of consistently good feeding during the growth of the lamb cannot be too strongly stressed. An uneven system of feeding and forcing lambs will result in lumpiness through excessive fat in certain parts. The perfect export lamb is not grossly fat, but has a maximum of meat properly spread with a reasonable covering of fat, and this can only be produced by regular and high quality feeding of both the ewe and lamb.

The Horse and His Food.

For perfect mastication the teeth of the horse must be in good order. Frequently in young animals mastication is imperfectly performed, due to faulty shedding of the first teeth; while in older animals, the edges of the teeth became so long and sharp that mastication becomes almost impossible. Horses so affected will bolt their food without proper crushing, and this, of itself, frequently causes colic through fermentation in the stomach. Teeth should be examined occasionally, and treated if necessary, as, apart from colic, faulty teeth are responsible for a great loss of condition.

If small balls of partly-chewed food are found in the manger, watch the horse eating, when it will probably be found that he gives two or three rapid movements of the jows, and drops the food from the mouth. This process is known as "quidding," and indicates that the teeth are badly in need of attention. Even horses whose teeth are in good order frequently bolt their food from habit. This should be prevented by mixing chaff or dry bran with the grain, and by placing several large stones in the manger to prevent bolters from securing too big mouthfuls at a time.

Another cause of bolting is the practice of giving boiled food. This is not only unnecessary, but often distinctly harmful. Boiling does not increase the digestibility of food, but permits of bolting without mastication, and sudden overloading of the stomach. Further, boiled food, if not given directly it has been prepared, is apt to undergo fermentation. Linseed is the only food that requires boiling before use.

Should a horse's stomach become overloaded he cannot relieve it by vomiting, as, owing to the anatomical arrangement, vomiting is impossible. To this danger must be added the further one that the pressure of food in an overloaded stomach may cause the opening into the small bowel to become closed also. When this takes place, food is imprisoned in the stomach, and after a short time ferments, and ultimately, owing to the stretching of its walls, the stomach becomes paralysed. Cases of this sort frequently occur, and rupture of the stomach is not an uncommon sequel.

Measuring the Weight of a Pig.

The smaller the animal the greater the risk of error in calculating the dead-weight from measurements and calculation. However, a rough guide may be obtained by measuring the length and girth, taking the girth of the animal in inches, just behind the shoulders (A B) right round the body, and measuring the length in inches from a point midway between the ears, along the curve of the back (C D), to the tail-head. Then to get the approximate dead-weight of the animal in pounds use the following formula:—

$$\frac{\text{Girth}^2 \times \text{length}}{524} = \text{Dead-weight in lb.}$$

Thus, if the length measured as shown were 46 in. and the girth 40 in., then by squaring the girth (i.e., multiplying it by itself) the result is 1,600, which multiplied by the length gives a product of 73,600. This figure, divided by 524, gives approximately 140 lb., which would be the dead-weight required.

There can be no doubt that the system of actually weighing the pigs alive is better, and this may be done conveniently by means of platform scales, or by means of a crate suspended from a large spring balance. If the live-weight is actually

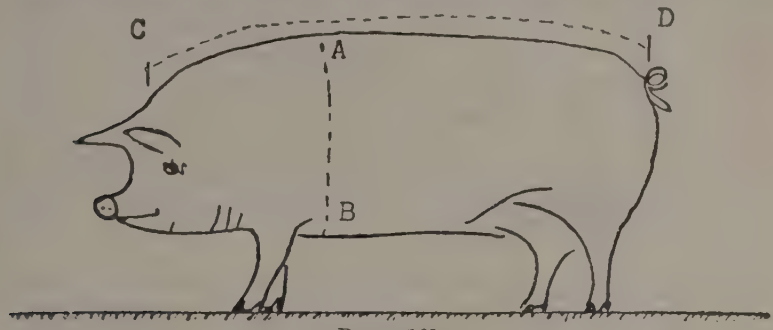


Plate 163.

taken by weighing in this way, then it is necessary to calculate the dead-weight from it by estimating that the figure required will be from 70 to 80 per cent. of the live-weight, according to skill in judgment and the degree of fatness attained by the animal.

Kikuyu Grass.

An object lesson that is mostly wasted on city folk is provided at present by the very profuse and luscious growth of Kikuyu grass on the eastern side of Sydney Domain, observes the "Agricultural Gazette." This grass was planted some eight years ago at the suggestion of the Department's Agrostologist, the idea being to keep down weed growth on a section of the park that was rough and otherwise difficult to keep free of weeds.

Not only does this area of Kikuyu demonstrate very forcibly the vigorous growth that this introduced grass is capable of making under suitable Australian conditions, but there is also provided an interesting comparison between paspalum (another introduction) and Kikuyu. Patches of both grasses are growing side by side and while both have been allowed to run wild, more or less, in appearance the Kikuyu grass has everything to recommend it while the paspalum is dry and matted, and would certainly prove most uninviting to cattle.

This is in accord with the general experience for some years past in coastal districts that Kikuyu grass will smother paspalum. In addition, Kikuyu grass has proved particularly suitable for planting in areas infested with bracken fern, ink weed (dye-berry), stinking roger, and weeds of similar type which frequently make headway at the expense of succulent pasture plants. It is thus an economic means of controlling these useless plants and of converting such areas into useful grazing land.

The Increasing Danger of Hydatids.

The article that appeared in our last issue ("Pastoral Review" for February, 1935) on the menace of hydatids, by a leading veterinarian, will, we hope, lead to greater care in the handling and control of station dogs. Hydatid disease is a most unpleasant complaint, and the steady increase in its incidence throughout our rural communities is a very serious matter. It is caused by a certain minute tapeworm of the dog, and Clunies Ross has found up to 40 per cent. of station dogs to be infected in New South Wales. In view of that fact it is not difficult to visualise the risk a human being runs every time he or she handles a station dog, for excreted eggs may well be on the latter's coat, and it is the simplest thing in the world for them to be transferred to the human mouth per medium of a cigarette or handkerchief or some other means. Again, the way young children are allowed to fondle dogs or to play about their kennels can only be appalling to those who know the extent and simplicity of infection. The reason why station dogs and country slaughterhouse dogs are far more often infected with the hydatid tape worm than city dogs is, as the article last month pointed out, because station dogs are fed on raw viscera of ration stock that are frequently infected, while country slaughterhouse dogs have access to diseased offal wherever there is lack of efficient supervision. City dogs are seldom found infected, because city meat supply is adequately inspected and all diseased offal is condemned before it can get into circulation. Insurance against contraction of the disease lies largely in country people's own hands. They must first prevent infection of their dogs by never feeding raw offal to them—boil it for ten minutes—and they must make it impossible for the dogs to get to the killing pen or any area where killing is done. Secondly, they must obviate any risk of infection from an already infected dog by exercising care in handling, by washing when possible after such, by regularly burning all droppings from around dog yards and kennels rather than allowing them to disintegrate and spread the hydatid eggs, and by treating dogs regularly with a reliable medicine to remove the hydatid tapeworm. Finally, in any country town of importance there should be centralised slaughtering and efficient veterinary supervision of the meat supply.—"The Pastoral Review."

Judging a Southdown Sheep.

Mr. A. L. Wheeler, a recognised authority on Southdown sheep, has set forth in the "New Zealand Farmer" the following points to be observed in judging sheep of this breed:—

The essential object in raising Southdowns, said Mr. Wheeler, was to meet the requirements of the fat lamb trade. In body it should be built more or less on the lines of a benzine box, but proportionately rather wider. The "box" should be set on legs absolutely at each corner. The feet of the Southdown were not quite as large as those of the Romney, but should be reasonably large. A narrow, pointed foot was undesirable. The pastern should be strong, and set so that the sheep could move. A straight pastern was not wanted. The bone above the pastern need not be big, but should slope back like the shoulders of a good horse, and have a shoulder flat and wide on top, a strong, wide back, and a flat loin. The ribs should turn well out, and the rump should be flat and square to the tail. The sheep should not slope down at the rear end, but should go straight down, with plenty of bulk in the hind legs.

Constitution and adequate heart room were most essential. The neck should be set in exactly with the shoulder, and must be broad, strong, and short. The Southdown should have a flat poll and should be wide and flat between the ears and eyes, with the face not too long, and broad, open, wide nostrils. The under jaw should be deep and strong, coming up square with the teeth, neither undershot nor overshot. Either of these defects was a culling point.

In Southdown rams, Mr. Wheeler observed, there should be colour and expression in the face. The approved colour was a soft- mousy tint. It might be darker or lighter, but should be even on head and feet. The poll should carry no horns. The ears should be not too large, with a nice "handle." The flesh should be soft but firm. Really spongy flesh meant fat. The wool of the Southdown was a secondary consideration from the utility point of view, but must be dense. It should be fine and even all over. The sheen of the skin when the wool was opened was very important. On any young sheep a real baby pink should be disclosed when the wool was opened.

Soy Beans—Limitations under Local Conditions.

The following notes on soy bean trials in New South Wales are of interest to Queensland farmers:—

Soy beans have long been a staple food producet of eastern countries, and have assumed considerable importance in the United States in view of the multiplicity of uses to which they can be put. In these countries their cultivation presents no difficulty. Realising the possibilities of such a legume in this State, either as a green manure crop, as hay or green feed, or for the many uses for which the grain may be utilised, the Department of Agriculture introduced soy beans into New South Wales many years ago. Many varieties have been introduced in the last twenty years and numerous field trials have been conducted in all parts of the State.

The results in the main, however, have been disappointing, and efforts to establish soy beans as a commercial crop have met with little success. The growth has been erratic—at times luxuriant but more often medium to poor; while grain yields, chiefly as a result of poor seed setting due primarily to some unfavourable climatic influence, have been low. A factor that is also responsible for the unsatisfactory growth appears to be the absence in our soils of the particular bacteria associated with the growth of nodules on the roots of the plants. This is substantiated by recent experiments at New England Experiment Farm, Glen Innes, where two strains of commercial inoculum from the United States gave an increase of six bushels over seed not inoculated.

As a summer legume for green manuring, soy beans are inferior to cowpeas on the coast, and they do not produce nearly the same bulk over a series of years. For this purpose, however, they should have some value on the Tablelands. On the Murrumbidgee Irrigation Area also they should be useful as a rotation crop, particularly with rice.

As a green fodder, although the growth has been generally satisfactory, it is difficult to find a place for them. There is usually an abundance of green feed at the time of the year at which they are available, and other legumes such as lucerne or cereals such as maize or sorghum are much more satisfactory. In some inland localities where maize is grown on river flats, as at Gundagai, Tumut, &c., and sheep are turned into the crop when it is reaching maturity to eat down weed growth, soy beans could be sown with advantage owing to their high feeding value.

In recent years the value of soy beans for human diet has received a good deal of prominence, and this has led to numerous inquiries regarding their cultivation for grain. From this standpoint the New England Tablelands has given the best results, although in wet seasons such as that of 1933-34 the crop has proved almost a failure in this respect. Rabbits and hares also have a particular liking for soy beans in their young stages of growth, and it is quite useless to attempt their cultivation in anything but well-netted areas where these pests are prevalent. Apart from the difficulty which considerable experience has shown exists in securing payable yields, soy beans can be imported so cheaply from the East, owing to cheap labour conditions, &c., that it is very apparent that they cannot be regarded at present as a commercially profitable crop to grow for grain in this State.

It will be seen from the foregoing that while under local conditions soy beans appear to have considerable limitations there are, nevertheless, districts in which they might well be introduced into the farming programme.

To Pull Out Stumps.

When pulling out a stump with a chain and team only, hook the chain round the bottom of the stump, not the top, with the hook on the opposite side to the team, and pass the chain over the top of the stump. This gives a leverage and increases the pulling power. A better way, with a little grubbing, is to get the chain round a big root, and pass over the tops of the stump as before.

To Square the Corner.

To square the corner when plotting out the site for a paddock or building, lay a 4-feet straightedge along one line from the corner peg, and another of 3 feet along the adjacent side. Then bring their ends exactly 5 feet apart and you will have a perfect right angle. From the height and base of the angle the sides may then be lined out.

PLATE 164.—ON COOCHIN COOCHIN, FASSIFERN DISTRICT, Q.

PLATE 165.—THE HOMESTEAD PADDOCK.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable deaths.

A MODEL SCHOOL.

I have recently enjoyed the privilege of visiting one of the oldest schools in Sydney—so old that one saw there something very rare in this young country—a flight of stone steps worn into grooves by the feet of many generations of small children. There I spent a delightful hour watching a form of education wholly new to me. It was not kindergarten, although it resembled this in spirit. These children of six to eight years were not playing games; they were performing tasks, but they were performing them spontaneously; they wished to learn, and even the most dull were helped forward by the pervading atmosphere of their comrades and their teachers. I have never seen children under more perfect control, and yet they had no notion that they were under any sort of discipline. A very thorough and practical knowledge of child psychology could be seen working with perfect smoothness. The power of positive suggestion was never better exemplified; there seemed to be no "don'ts" in this school. A small class of a dozen or fifteen children would sit on a mat in front of the teacher, who talked to them in a quiet voice asking questions and suggesting answers, her eyes glancing from one child to another, keeping them all in direct mental contact. After fifteen or twenty minutes the strain was relaxed, and the class dispersed for individual study. Each in his or her little chair was engaged in some pleasing task. Some were learning arithmetic by the aid of various devices, some were writing or drawing, some figuring with firm strokes of chalk on a blackboard, some reading. One little girl next to me was reading a small picture-book about a pup, not as a conscious task, but evidently because she wanted to know all about that pup.

In schools, even in well-to-do districts, one expects to see a percentage—sometimes a considerable percentage—of poorly-nourished children. Here I saw none. I was struck by the good nutrition and physical condition of these children, more especially as this school was situated in one of the poorest districts of Sydney. Indeed, this was the special reason for my visit. I was told that their health had not always been so good. There had been a careful investigation in 1921, and it was then found that 25 per cent. of the children were below standard weight.

The Health Game.

In that year was instituted the "Health Game." This was to be no formal instruction. Sickness was never mentioned. The whole stress was to be laid on "health, strength, joy." The children were informed that on a certain day at a certain hour a new game would be started. At the fixed time they all assembled in the hall full of expectation,, and the game was explained. Each child could join in as he or she pleased.

Points in the game could be scored daily—one for a bath, one for brushing the teeth, one for eating green vegetables, one for living in a room with the windows open, and so on. A meeting of the mothers was called, and the game explained to them. It caught on. Even the fathers were drawn in. One navvy was observed walking home carrying a bath. He walked into the kitchen and dumped it on the floor, saying, "Here's your damned bath," while the children cried out with glee, for now each could score another point daily.

Healthy Food.

Members of a dairy farmers' co-operative company were drawn into the health game. They thought it would be good business to provide this school of poor children with twenty pints of the best pasteurised milk daily as an experiment. The experiment was a great success. After six months all the under-nourished children had reached normal weight or more.

I watched the children taking their milk at half-past ten. Each child had a half-pint bottle, or one-third of a pint for some of the smallest, and a straw. Drinking the milk was perfectly voluntary, but each child emptied its bottle slowly, then rinsed the bottle, and put it in the rack for removal. I then visited the lunch room, where two volunteers were preparing the health lunch to be taken later in the day. Wholemeal bread was being cut into sandwiches with egg, cheese, tomatoes, plenty of fresh lettuce, &c.

This model school shows what is possible. I wish there were more like it.

IN THE FARM KITCHEN.

COOKING VEGETABLES.

All recipes are on the basis of six servings.

Spinach.

Spinach, salt, butter, hard cooked eggs.

(1) Wash spinach in several waters.
(2) Discard the stems and put leaves in a saucepan.
(3) Cover saucepan closely and cook gently for about thirty minutes. (It may be necessary to add a little water.)
(4) When spinach is tender add salt.
(5) Drain and chop fine.
(6) Add butter and serve garnished with hard cooked eggs.

Baked Squash.

Squash, butter, pepper, and salt.

(1) Cut squash in halves.
(2) Remove seeds and stringy parts.
(3) Place in a pan with a little water.
(4) Cover pan and steam in the oven until tender (about two hours).
(5) Remove from shell, mash, and season with butter, salt, and pepper.

Glazed Onions.

One dozen butter onions, 3 tablespoons butter, 2 tablespoons sugar.

(1) Peel onions and prick.
(2) Cook in boiling salted water for fifteen minutes (1 teaspoon to 2 cups water).
(3) Drain and dry on a cloth.
(4) Melt butter and add sugar.
(5) Add onions and simmer gently for twenty to thirty minutes, basting occasionally.

Escalloped Potatoes.

Four medium potatoes (raw), 1 teaspoon salt, ¼ teaspoon pepper, 1 tablespoon butter, 2 teaspoons flour, 1 cup hot milk.

(1) Cut peeled potatoes into ¼-inch slices.
(2) Put a layer of potatoes in a buttered baking dish.
(3) Sprinkle with salt and pepper.
(4) Dredge with flour and dot with butter.
(5) Repeat.
(6) Add hot milk until it may be seen through top layer of potatoes.
(7) Bake for one and a-quarter hours or until soft.

Creamed Potatoes.

Two cups cold boiled potatoes, 2 tablespoons butter, 1 tablespoon chopped onion, 1 tablespoon flour, 1 cup milk, 1 tablespoon chopped parsley.

(1) Melt butter in saucepan.
(2) Add onion and cook until slightly browned.
(3) Add flour, stir well.
(4) Add milk and stir until sauce thickens.
(5) Add potatoes cut in cubes, and cook until potatoes are heated through.
(6) Turn into a hot dish.
(7) Sprinkle with parsley and serve.

Glazed Sweet Potatoes.

Six medium sized sweet potatoes, ¼ cup butter, ¼ cup water, 2 tablespoons sugar.

(1) Boil sweet potatoes until soft.
(2) Cut in halves and lay evenly in baking dish.
(3) Pour over the potatoes a syrup made of butter, sugar, and water.
(4) Bake in a hot oven until tender and nicely browned.

Harvard Beetroot.

Three medium sized beetroot, ½ cup sugar, 2 tablespoons butter, ½ teaspoon maizena, ¼ cup vinegar.

(1) Cook beets until soft.
(2) Peel and cut in cubes.
(3) Mix sugar and maizena.
(4) Add vinegar and boil mixture for five minutes.
(5) Pour over beets and let stand on the back of the stove for half an hour.
(6) Just before serving, add the butter.

Mint Glazed Carrots with Peas.

Three medium sized carrots, 3 tablespoons butter, ½ cup sugar, 1 tablespoon chopped fresh mint, 1 cup boiled peas.

(1) Wash, scrape, and cut carrots into ¼-inch slices.
(2) Cook in boiling salted water fifteen minutes.
(3) Drain and put into a saucepan with butter, sugar, and mint.
(4) Cook slowly until soft and glazed.
(5) Heat the peas and season with butter, salt, and pepper.
(6) Turn peas on hot serving dish and surround with carrots.

Cauliflower.

One medium sized cauliflower, 1 tablespoon butter, 1 tablespoon flour, ½ teaspoon salt, ½ cup milk, ½ cup breadcrumbs.

(1) Cut stalk close to cauliflower and remove the green leaves.
(2) Soak in salted water for one hour (1 tablespoon salt to 1 gallon water).
(3) Cook in boiling water twenty to thirty minutes.
(4) Place in a hot serving dish and pour over white sauce.
(5) Sprinkle with breadcrumbs mixed with melted butter.
(6) Heat in oven until crumbs are brown.

White Sauce.

(1) Melt butter in saucepan.
(2) Add flour and salt.
(3) Blend well and add milk.
(4) Cook until thick and creamy.

Escalloped Cabbage.

One small head cabbage, 3 cups stale breadcrumbs, 1 tablespoon butter, 1½ teaspoons salt, ⅛ teaspoon pepper, milk.

(1) Chop the cabbage fine.
(2) Cover the bottom of a buttered baking dish with cabbage.
(3) Put a layer of breadcrumbs.
(4) Continue alternately until dish is two-thirds full.
(5) Sprinkle crumbs on top, dot with butter.
(6) Add salt and pepper to milk and barely cover cabbage in dish.
(7) Bake in a moderate oven for forty-five minutes or until cabbage is tender.

POINTS IN PAINTING FARM BUILDINGS.

PREPARATION OF THE SURFACE.

The proper preparation of surfaces for painting is more important than is generally supposed. They should be smooth and clean—quite free, that is, of dust, moisture, smoke stain, or any matter foreign to the paint or the material to be painted. To make surfaces smooth calls for the removal of excrescences or the filling of voids, and each of the following will have its special use:—Sandpaper (fine and middle 2), steel wool No. 2, patent pumice stone, and also a putty knife. An artisan's equipment would include a blow-lamp for the removal of cracked or peeling paint, &c. The risk of fire, however, might make this dangerous in the hands of an amateur if used on a weatherboard structure.

Knots and veins that exude gum should be smoothed off and given a coat of shellac or patent knotting. Holes should be stopped with putty (this consists of whiting and linseed oil), but not until the priming coat has been applied.

Moisture is one of the greatest destroyers of paint. It may be in the timber (unseasoned timber) or on the surface in the form of condensation, in which case, particularly in kitchens where gas fumes from the stove condense upon cold surfaces, it may contain sulphur, which is a great destroyer of white-lead paint.

Tacky paint can be successfully prepared for painting by coating it with lime-water (not limewash). The water in which lime has been slaked will, if allowed to stand for some time, become quite clear. It is this clear water that should be used.

Smoky ceilings and walls should, if extremely dirty, be first washed with water and soda. If in fair condition a coat of lime-water will suffice. Rub down between each coat of paint to remove excrescences. Remove dirt from corners, quirks of mouldings, &c., with putty knife, and always use the dusting brush well in advance of the painting.

Orchard Notes for May.

THE COASTAL DISTRICTS.

IN these notes for the past two months the attention of citrus-growers has been called to the extreme importance of their taking every possible care in gathering, handling, packing, and marketing, as the heavy losses that frequently occur in Southern shipments can only be prevented by so treating the fruit that it is not bruised or otherwise injured. It has been pointed out that no citrus fruit in which the skin is perfect and free from injury of any kind can become blue-mouldy, as the fungus causing the trouble cannot obtain an entry into any fruit in which the skin is intact. Growers are, therefore, again warned of the risk they run by sending blemished fruit South, and are urged to exercise the greatest care in the handling of their fruit. No sounder advice has been given in these notes than that dealing with the gathering, handling, grading, packing, and marketing, not only of citrus, but of all other classes of fruit.

It is equally as important to know how to dispose of fruit to the best advantage as it is to know how to grow it. To say the least, it is very bad business to go to the expense of planting and caring for an orchard until it becomes productive and then neglect to take the necessary care in the marketing of the resultant crop. Main crop lemons should be cut and cured now, instead of being allowed to remain on the tree to develop thick skins and coarseness. As soon as the fruit shows the first signs of colour or is large enough to cure down to about from 2¼ to 2½ inches in diameter, it should be picked, care being taken to handle it very gently, as the secret of successfully curing and keeping this fruit is to see that the skin is not injured in the slightest, as even very slight injuries induce decay or specking. All citrus fruits must be sweated for at least seven days before being sent to the Southern States, as this permits of the majority of blue-mould infected or fly-infested fruits being rejected. Citrus trees may be planted during this month, provided the land has been properly prepared and is in a fit state to receive them; if not, it is better to delay the planting till the land is right.

In planting, always see that the ground immediately below the base of the tree is well broken up, so that the main roots can penetrate deeply into the soil and not run on the surface. If this is done and the trees are planted so that the roots are given a downward tendency, and all roots tending to grow on or near the surface are removed, the tree will have a much better hold of the soil and, owing to the absence of purely surface roots, the land can be kept well and deeply cultivated, and be thus able to retain an adequate supply of moisture in dry periods. Do not forget to prune well back when planting, or to cut away all broken roots.

All orchards, pineapple and banana plantations should be kept clean and free from all weed growth, and the soil should be well worked so as to retain moisture.

Custard apples will be coming forward in quantity, and the greatest care should be taken to see that they are properly graded and packed for the Southern markets, only one layer of one-sized fruit being packed in the special cases provided for this fruit—cases which permit of the packing of fruit ranging from 4 to 6 in. diameter in a single layer.

Slowly acting manures—such as meatworks manure—may be applied to orchards and vineyards during the month, and lime can be applied where necessary. Land intended for planting with pineapples or bananas during the coming spring can be got ready now as, in the case of pineapples, it is a good plan to allow the land to lie fallow and sweeten for some time before planting; and, in the case of bananas, scrub fallen now gets a good chance of drying thoroughly before it is fired in spring, a good burn being thus secured.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

CLEAN up all orchards and vineyards, destroy all weeds and rubbish likely to harbour fruit pests of any kind, and keep the surface of the soil well stirred, so as to give birds and predaceous insects every chance to destroy any fruit fly pupæ which may be harbouring in the soil. If this is done, many pests that would otherwise find shelter and thus be able to live through the winter will be exposed to both natural enemies and cold.

Further, it is a good plan to clean up the land before pruning takes place, as, if delayed till the pruning has been finished, the land is apt to dry out.

Pruning can be started on such varieties as have shed their leaves towards the end of the month, as it is a good plan to get this work through as early in the season as possible, instead of putting it off until spring. Early-pruned trees develop their buds better than those pruned late in the season. These remarks refer to trees—*not vines*, as the later vines are pruned in the season the better in the Granite Belt

district, as late-pruned vines stand a better chance to escape injury by late spring frosts.

All worthless, badly diseased, or worn-out trees that are no longer profitable, and which are not worth working over, should be taken out now and burnt, as they are only a menace and a harbour for pests.

Land intended for planting should be got ready as soon as possible, as, if ploughed up roughly and allowed to remain exposed to the winter frosts, it will become sweetened and the trees planted in it will come away much better than if set out in raw land. In any case the land must be properly prepared, for once the trees are planted it is a difficult matter to get the whole of the land as well worked as is possible prior to planting.

Slowly acting manure—such as ground island phosphates or basic phosphates—may be applied to orchards and vineyards. They are not easily washed out of the soil, and will become slowly available and thus ready for use of the trees or vines during their spring growth. Lime may also be applied where necessary.

This is a good time to attend to any drains—surface, cut-off, or underground. The two former should be cleaned out, and in the case of the latter all outlets should be examined to see that they are quite clear and that there is a good getaway for the drainage water. New drains may also be put in where required.

In the warmer parts citrus fruits will be ready for marketing, and lemons ready for cutting and curing. The same advice that has been given with respect to coast-grown fruit applies equally to that grown inland, and growers will find that careful handling of the fruit will pay them well. Lemons grown inland are, as a rule, of superior quality to those grown on the coast, but are apt to become too large if left too long on the trees, so it is advisable to cut and cure them as soon as they are ready. If this is done and they are properly handled they may be kept for months, and will be equal to any that are imported.

If the weather is very dry, citrus trees may require an irrigation, but, unless the trees are showing signs of distress, it is better to depend on the cultivation of the soil to retain the necessary moisture, as the application of water now is apt to cause the fruit to become soft and puffy, so that it will not keep or carry well.

Land intended for new orchards should be got ready at once, as it is advisable to plant fairly early in the season in order that the trees may become established before the weather again becomes hot and dry. If the ground is dry at the time of planting, set the trees in the usual manner and cover the roots with a little soil; then give them a good soaking; and, when the water has soaked into the soil, fill the hole with dry soil. This is much better than surface watering.

Farm Notes for May.

FIELD.—May is usually a busy month with the farmer—more particularly the wheatgrower, with whom the final preparation of his land prior to sowing is the one important operation. Late-maturing varieties should be in the ground by the middle of the month at the latest.

Clover land, intended primarily for feeding off, should be sown not later than the end of April.

Seed wheat should be treated with copper carbonate for the control of bunt. For oats and barley seed the use of formalin or a reliable mercury dust is advisable.

Potatoes, which in many districts are still somewhat backward, should have by this time received their final cultivation and hilling-up.

The sowing of prairie grass on scrub areas may be continued, but should be finished this month. This is an excellent winter grass, and does well in many parts of Southern Queensland. Prairie grass seed should be treated with formalin or a reliable mercury dust before sowing.

Root crops, sowings of which were made during April, should now receive special attention in the matter of thinning out and keeping the soil surface well tilled to prevent undue evaporation of moisture.

Every effort should be made to secure sufficient supplies of fodder for stock during the winter, conserved either in the form of silage or hay.

Cotton crops are now fast approaching the final stages of harvesting. All consignments to the ginnery should be legibly branded with the owner's initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus the address labels.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF FEBRUARY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1935, AND 1934, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Feb.	No. of Years' Records.	Feb., 1935.	Feb., 1934.		Feb.	No. of Years' Records.	Feb., 1935.	Feb., 1934.
North Coast.	In.		In.	In.	*Central Highlands.*	In.		In.	In.
Atherton	10·60	34	7·63	18·80	Clermont	4·27	64	1·08	6·13
Cairns	15·71	53	14·94	22·75	Gindie	2·82	36	..	6·13
Cardwell	16·72	63	10·72	12·96	Springsure	3·92	66	1·09	3·56
Cooktown	13·77	59	6·49	21·42					
Herberton	7·97	49	4·64	19·07					
Ingham	16·04	43	7·95	16·69					
Innisfail	22·47	54	16·21	28·45					
Mossman Mill	18·21	22	11·48	33·95	*Darling Downs.*				
Townsville	11·15	64	0·60	14·19					
Central Coast.					Dalby	2·89	65	1·47	4·42
					Emu Vale	2·55	39	3·86	2·46
					Hermitage	2·53	29	1·25	3·19
Ayr	8·94	48	2·51	12·57	Jimbour	2·68	47	2·49	4·48
Bowen	8·72	64	4·98	12·69	Miles	2·75	50	0·36	4·82
Charters Towers	4·45	53	2·15	7·02	Stanthorpe	3·20	62	3·15	2·53
Mackay	11·39	64	16·59	11·76	Toowoomba	4·60	63	3·67	10·8
Proserpine	12·00	32	17·41	14·22	Warwick	3·08	70	2·84	3·3
St. Lawrence	7·85	64	3·19	11·76					
South Coast.									
					Maranoa.				
Biggenden	4·52	36	3·09	11·29					
Bundaberg	6·65	52	6·32	19·26	Roma	2·94	61	0·97	3·60
Brisbane	6·41	84	5·59	16·16					
Caboolture	7·93	48	7·28	16·95					
Childers	6·92	40	4·22	21·54					
Crohamhurst	13·07	42	16·03	18·11					
Esk	5·59	48	3·91	8·96					
Gayndah	4·28	64	5·15	8·58					
Gympie	6·85	65	8·35	18·83	*State Farms, &c.*				
Kilkivan	5·02	56	3·04	12·91					
Maryborough	6·87	64	7·04	21·16	Bungeworgoral	2·22	21	0·75	3·62
Nambour	9·76	39	15·64	15·62	Gatton College	3·53	36	5·98	6·56
Nanango	4·14	53	3·49	5·45	Kairi	9·99	21	7·79	14·51
Rockhampton	7·82	64	3·79	16·27	Mackay Sugar Experiment Station	10·36	38	15·44	9·28
Woodford	8·59	48	9·28	13·21					

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—FEBRUARY, 1935.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·74	93	71	102	14, 16	66	4	649	8
Herberton	..	87	65	96	16	59	7, 11, 20	464	19
Rockhampton	29·82	93	73	100	15	68	28	379	15
Brisbane	29·90	86	70	93	19	64	3	559	19
Darling Downs.									
Dalby	29·87	89	63	98	19	52	3	147	5
Stanthorpe	..	81	57	90	5, 19	41	3	315	11
Toowoomba	..	84	63	93	19	56	3	367	11
Mid-Interior.									
Georgetown	29·77	97	74	104	18	62	11	279	6
Longreach	29·78	103	72	111	16, 19	62	11, 26	86	4
Mitchell	29·84	96	65	105	19	52	3, 10	9	3
Western.									
Burketown	29·76	98	78	106	15	67	1	224	4
Boulia	29·79	102	76	113	16, 17	66	10, 11	..	..
Thargomindah	29·84	96	71	108	18	59	10, 11		

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	April. 1935.		May. 1935.		Apr., 1935.	May., 1935.
	Rises.	Sets.	Rises.	Sets.	MOONRISE. Rises.	MOONRISE. Rises.
					a.m.	a.m.
1	6·2	5·50	6·18	5·20	3·9	4·11
2	6·3	5·49	6·18	5·19	4·17	5·17
3	6·3	5·48	6·19	5·18	5 23	6·22
4	6·4	5·46	6·20	5·17	6·29	7·27
5	6·4	5·45	6·20	5·17	7·34	8·29
6	6·5	5·44	6·21	5·16	8·41	9·27
7	6·5	5·43	6·21	5·15	9·45	10·19
8	6·6	5·42	6·22	5·14	10·45	11·5
9	6·6	5·41	6·23	5·14	11·39	11·45
					p.m.	p.m.
10	6·7	5·40	6·23	5·13	12·27	12·20
11	6·7	5·39	6·24	5·12	1·11	12·51
12	6·8	5·38	6·24	5·11	1·48	1·19
13	6·8	5·37	6·25	5·11	2·20	1·48
14	6·9	5·36	6·26	5·10	2·51	2·17
15	6·9	5·35	6·26	5·10	3·18	2·49
16	6·9	5·35	6·27	5·9	3·48	3·22
17	6·10	5·34	6·27	5·9	4·18	3·59
18	6·10	5·33	6·28	5·8	4·48	4·43
19	6·11	5·32	6·29	5·8	5·24	5·37
20	6·11	5·31	6·29	5·7	6·5	6·33
21	6·12	5·30	6·30	5·7	6·51	7·35
22	6·12	5·29	6·30	5·6	7·44	8·38
23	6·13	5·28	6·31	5·6	8·40	9·45
24	6·14	5·26	6·32	5·5	9·42	10·51
25	6·14	5·25	6·33	5·5	10·46	11·55
26	6·15	5·24	6·33	5·4	11·53	a.m.
27	6·15	5·24	6·34	5·4	a.m.	12·58
28	6·16	5·23	6·34	5·3	12·57	2·0
29	6·16	5·22	6·35	5·3	2·2	3·2
30	6·17	5·21	6·35	5·2	3·5	4·7
31			6·36	5·2		5·14

Phases of the Moon, Occultations, &c.

3 April	●	New Moon	10 11 p.m
11 „	☾	First Quarter	3 42 a.m.
19 „	○	Full Moon	7 10 a.m.
26 „	☽	Last Quarter	2 20 p.m.

Perigee, 2nd April, at 6.12 a.m.
Apogee, 14th April, at 5.48 a.m.
Perigee, 30th April, at 2.0 a.m.

At 10 a.m. on the 6th the young Moon and Venus will be within 4 degrees of each other, the Moon having risen 22 degrees north of east 1 hour 19 minutes earlier.

Mars on the 6th will be in opposition to the Sun, rising only 7 minutes after the Sun has set.

At 5 a.m. on the 21st the Moon will be passing 6 degrees south of Jupiter when both are prominent objects in the north-west about an hour and a quarter before sunrise.

On the 27th the quickly moving planet Mercury, being in superior conjunction with the Sun, will be lost in its rays, at a distance (momentarily) of 123,555,243 miles from the Earth.

When the Moon rises 4½ degrees south of east at 2.2 a.m. on the 29th, Saturn will be only 5 degrees south of it, becoming more observable as they rise higher till they fade into the coming daylight.

Mercury rises at 4.18 a.m., 1 hour 44 minutes before the Sun, on the 1st; on the 15th it rises at 4.59 a.m., 1 hour 10 minutes before the Sun.

Venus sets at 7.23 p.m., 1 hour 33 minutes after the Sun, on the 1st; on the 15th it sets at 7.25 p.m., 1 hour 50 minutes after the Sun.

Mars rises at 6.17 p.m. and sets at 6.41 a.m. on the 1st; on the 15th it rises at 5.5 p.m. and sets at 5.23 a.m.

Jupiter rises at 7.59 p.m. and sets at 9.21 a.m. on the 1st; on the 15th it rises at 6.52 p.m. and sets at 8.36 a.m.

Saturn rises at 3.22 a.m. and sets at 4.16 p.m. on the 1st; on the 15th it rises at 2.31 a.m. and sets at 3.27 p.m.

The Moon's path in April, commencing at 8 p.m., will be in Aquarius on the 1st; in Pisces from the 2nd to the 4th; in Aries on the 4th and 5th; in Taurus from the 5th to 9th; in Gemini to 11th; in Cancer to 13th; in Leo to 16th, passing Regulus at 1 p.m. on the 14th, about 3 degrees south of it; in Virgo on the 19th, passing 4 degrees south of Spica, when full, at 4 a.m. on that date; it will be in Libra to the 21st and in Scorpio on the 21st; in Orphincus to the 23rd (about 5 degrees north of Scorpio); in Sagittarius to the 25th; in Capricornus to 27th; again in Aquarius to the 29th; and in Pisces on the 30th.

3 May	●	New Moon	7 36 a.m.
10 „	☾	First Quarter	9 54 p.m.
18 „	○	Full Moon	7 57 p.m.
25 „	☽	Last Quarter	7 44 p.m.

Apogee, 12th May, at 12.18 a.m.
Perigee, 26th May, at 2.30 a.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes, at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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